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A STUDY OF THE INFLUENCE OF SOME FACTORS IN STYLE OF COMPOSITION ON THE INTEREST, COMPREHENSION, AND RATE OF READING OF FOURTH-GRADE PUPILS*

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INTRODUCTION

1. Origin and Statement of the Problem

When one selects reading materials for children, or when he prepares materials to be read by them, the following questions are likely to claim his attention: What is it in a given selection which determines whether a child will like or dislike it? What is it which determines whether he will read the material rapidly or slowly? What determines the extent to which he understands the content? Is it the type of material? Is it the plot of the story, the characters, the arrangement of events? Is it the difficulty of words? Is it the form of composition? Is it the personal charm of the writer which reflects itself in the story? In short, what are the elements in a reading selection which determine a pupil's interest, his rate of reading, and his comprehension?

A survey of the summaries of reading investigations[1] reveals a number of studies touching upon this question. Those studies of the elements of a reading selection which influence interest tend to center around the following general topics: characteristics of the story, type of material, and the form in which it is written. The findings of the investigations relating to factors which influence comprehension are frequently due to such facts as differences in teaching emphasis, in the amount read, in the training and experience of the teachers, in the size of the school, and in the race, nationality, and sex of the pupils.[2]

Among the studies relating to factors which influence rate of reading, the following factors were named: practice in rapid silent reading, vocalization in silent reading, training in perception, character of subject matter, eye movement habits, purpose of reading, concentration of attention, ability to grasp meaning, reaction time, and the type of imagery employed by the reader.[3]

In all of the studies observed, one notices that few of them touch upon

*This study was submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the graduate school of the University of Missouri, 1935. Miss Burk is now Professor of Elementary Education and Children's Literature, State Teachers College, East Radford, Virginia.

1. Gray, William Scott, Summary of Investigations Relating to Reading.
2. Ibid. p. 103.
3. O'Brien, John A., Silent Reading, Chapter XIV.

any phase of the style of writing as an influence upon interest, comprehension, or rate of reading. That this is an important factor, and that studies are needed to measure its importance has been indicated by many teachers and writers.

It is quite possible that the lack of studies concerning the influence of style in the reading process is due to the elusive nature of style. Style, however, is accorded a dual meaning by most writers on the subject. One interpretation refers to the unteachable portion of the art of writing--to those differences which lie within individuals, their power and manner of perceiving and of feeling, and their manner of expressing these perceptions and feelings. Style according to this interpretation would be difficult to measure objectively. The second meaning of style is that which refers to the portion of the art of writing which can to some extent be taught. This conception may be divided into such elements as words, sentences, paragraphs, and whole compositions. Objective measurements of these elements of style is possible. By making a study of the relationship of each of these elements to reading rate, comprehension, and interest, it would seem that the part which the style of a reading selection plays in interest, comprehension, and rate of reading could be determined to some degree of certainty.

Acting upon this premise, two factors, or elements, in style of writing have been chosen for this investigation, the length and kind of sentence and the form in which the selection is written.

The study will attempt to answer the following questions:

(1) Does it make any difference in the pupils' interest, comprehension, and rate of reading, whether the selection is written in short simple sentences, in long complex and compound sentences, or in a mixture of long and short, simple, complex, and compound sentences?

(2) Does it make any difference in pupils' interest, comprehension, and rate of reading, whether the selection is written in the form of a play, if it is written in a form containing direct conversation, or if it is written in a form containing indirect conversation?

The field chosen for study and experimentation is the fourth grade. The reasons for the choice are:

(1) Studies[4] indicate rather definitely characteristics which appeal to children's interest, so there is a working basis for the selection of material which will likely be of interest to fourth-grade children.

(2) There is apparently little or no difference in the reading interests of boys and girls up to eight or nine years of age.[5] There would, then, be little difference in interest response due to sex.

(3) By the fourth grade, reading habits are fairly well established. The rate of recognition usually exceeds the rate of articulation between the second and fourth grade.[6] For these reasons, other things being equal, pupils in the fourth grade should be able to read silently material prepared for that level with a minimum amount of difficulty.

(4) It is probable that accurate and satisfactory results from standardized tests may be obtained from fourth-grade pupils.

The problem stated, is: A Study of the Influence of Certain Factors in Style of Composition on the Interest,

4. Dunn, Fannie W., Interest Factors in Primary Reading Material.
Garnett, Wilma Leslie, "A Study of Children's Choices in Prose", Elementary English Review, I (June 1915), p. 42.
Uhl, Willis L., Scientific Determination of the Content of the Elementary School Course in Reading.

5. Belser, Danylu, "The Reading Interests of Boys", Elementary English Review, III (November, 1926), pp. 292-96.

6. Gray, William Scott, Summary of Investigations Relating to Reading, p. 134.

Comprehension and Rate of Reading of Fourth-Grade Pupils.

PREPARATION OF THE EXPERIMENT

1. General Plan

It is proposed to solve this problem by interpreting the results of a carefully prepared experiment.

Three basic stories entirely different in character and plot were chosen: an animal story, a child activity story, and an Indian story. The vocabulary of each story was adapted to fourth-grade difficulty. Each of the three stories was written in nine different forms.

(1) Narrative form including direct conversation and containing a mixture of short simple sentences and long complex and compound sentences
(2) Narrative form including direct conversation and containing short simple sentences
(3) Narrative form including direct conversation and containing long complex and compound sentences
(4) Narrative form including indirect conversation and containing a mixture of short simple sentences and long complex and compound sentences
(5) Narrative form including indirect conversation and containing short simple sentences
(6) Narrative form including indirect conversation and containing long complex and compound sentences
(7) Play form containing a mixture of short simple sentences and long complex and compound sentences
(8) Play form containing short simple sentences
(9) Play form containing long complex and compound sentences

Each of these nine forms was presented to 200 fourth-grade pupils making a total of 1800 children considered in the experiment. Every child read one form of these stories.

A pupil's rate of reading for each of the three stories read was determined. An objective test was used to determine his comprehension of each story. His interest or lack of interest was checked on an interest response sheet prepared for this purpose.

The results of the experiment were analyzed to determine whether the length and kind of sentence or the form in which the story was written seemed to have any influence upon the interest, the comprehension, or the rate of reading of these 1800 fourth-grade pupils.

2. Selection of Stories

The following criteria were used in selecting the three basic stories:

(1) A theme known to be of interest to fourth-grade pupils
(2) A story written for children of fourth-grade age
(3) A story of such length that it could be read by the average fourth-grade child in about ten minutes
(4) A good plot

a. The animal story

"Numskull and the Rabbit" was chosen as the animal story. This story was translated from The Panchatantra by Arthur Ryder and now appears in the book, A Baker's Dozen, a group of stories selected by Mary Gould Davis and presented by the Junior Literary Guild as suitable for boys and girls nine, ten, and eleven years of age.

In addition to meeting the criteria set up for selecting the stories, the chosen story has action, some humor, a satisfactory ending and a moral lesson, which according to Wissler[7] was preferred by 26 per cent of the girls and 20 per cent of the boys. The story has the disadvantage of being untrue to life. This disadvantage is minimized, however, when one considers that according to Uhl's[8] study, fairy and supernatural ranked second in preference by fourth-grade pupils.

7. Wissler, Clark, "The Interests of Children in the Reading Work of the Elementary Schools", Pedagogical Seminary, V (April 1895) p. 523-40.
8. Uhl, Willis L., Scientific Determination of the Content of the Elementary School Course in Reading.

b. The child activity story

Two Children of Tyre is a book by Louise Andrews Kent telling of the adventures of a lad who sailed with a great trading fleet three thousand years ago, and of his sister who stayed at home in the busy city of Tyre. This book was also presented by the Junior Literary Guild for boys and girls nine, ten, and eleven years of age. The first chapter, called "Eggs and Pomegranates", contains an interesting incident which was selected as the second basic story for the experiment. In addition to meeting the criteria set up, the story has other desirable factors such as dramatic action, surprise, humor, fighting, and natural child experience.

c. The Indian story

While Indian stories, as such, are not listed in the studies previously mentioned as of particular interest to children of the fourth grade, experience has proved that children of that grade do like them. Elaborate experiments carried on for a number of years at the University Elementary School, Columbia, Missouri, give evidence of a very great interest on the part of fourth-grade pupils in Indian stories. Furthermore, since a study of Indians is outlined in the Missouri Courses of Study in history for grade four, the pupils participating in the experiment are assumed to have some interest in the topic. The story, "Sacajawea, The Bird Woman", was chosen. The story as presented was adapted from several stories and articles. Those used most extensively were The Bird Woman of the Lewis and Clark Expedition by Katherine Chandler, a supplementary reader for first and second grades, and the story, "Sacajawea, the Bird Woman", from Redskin and Pioneer, by J. Neilson Barry and Henry Max Barr, a book suitable for about fifth grade. The story has some dramatic action, interesting characters, heroism and adventure. It is true to life and is in a measure connected with the history of our state.

d. Adaptations of the stories

The stories were cut so that the length of the three would be approximately the same. The poetry in "Numskull and the Rabbit" was omitted. "Eggs and Pomegranates" was changed to make a complete story in itself rather than a chapter in a long story. Many words too difficult were changed to others which would come within the range of a fourth-grade vocabulary.

3. Selection of Vocabulary

The vocabulary of the stories selected was checked by the Thorndike[9] word list to determine the suitability of the words for fourth-grade pupils. Whenever a word was too difficult it was replaced by a synonym which ranked within the vocabulary for fourth grade.

One story representing each of the three subjects was then written. Each of these contained a mixture of long and short, simple, complex, and compound sentences. "Numskull and the Rabbit" and "Eggs and Pomegranates" contained direct conversation. "Sacajawea, the Bird Woman" contained indirect conversation. The vocabulary of each of these stories was well within the Thorndike[10] list. From these three basic stories, the other eight forms of each were written.

In order to keep as many factors as possible constant, it was desirable to have a great many words common to all stories, or so simple they would of a certainty be understood by fourth-grade pupils. By this arrangement one might also be assured that vocabulary difficulty would not be a determining factor in the interest response for any one story. It was assumed that words in the first 1000 of the Thorndike list would be familiar to all fourth-grade pupils.

After the twenty-seven stories were written the vocabularies were carefully checked by the Thorndike list.

9. Thorndike, Edward L., A Teacher's Word Book of the Twenty Thousand Words Found Most Frequently and Widely in General Reading for Children and Young People.

10. Ibid.

Every word was listed separately with its frequency in each story and its rating in the Thorndike list. The stories prepared and selected for the experiment present the following facts concerning vocabulary:

In the animal story, "Numskull and the Rabbit", there are 469 different words. Of these, 87 per cent are common to all twenty-seven stories, or are found in Thorndike's first 1000 words. All of the words except seventeen are found in the first 4000 of the Thorndike list. Only two are listed by Thorndike above the first 5000.

In the child activity story, "Eggs and Pomegranates", there are 446 different words. Of these, 93 per cent are common to all stories or are in Thorndike's first 1000 words. Only eleven are above the first 4000. Only two are listed above the first 5000.

In the Indian story, "Sacajawea, the Bird Woman", there are 442 different words. Of these, 95 per cent are common to all stories or are in Thorndike's first 1000. Eleven words are above the first 4000. Five Indian names do not appear in the Thorndike list. They are: Sacajawea, Shoshonee, Charboneau, Cameahwait and Mandan.

A study used as one basis for assuming that words within Thorndike's first 5000 are suitable for fourth-grade pupils is that made by Gregory.[11]

4. Basis for Determining Length of Sentences

Four of the newer fourth-grade reading texts in rather general use in the state were carefully examined to see if they afforded a basis for determining length of sentences. The number of words in each sentence in all the stories was counted. The length of sentences varied from two words to eighty. The variation was so great that such a study did not seem useful as a basis for determining sentence length.

Brewster[12] has the following to say about long and short sentences:

> This is a loose rhetorical classification of no grammatical significance whatsoever. The classification is loose because the line between long and short is hard to draw. The average English sentence nowadays is said to contain about thirty words. Any sentence over fifty words would probably be called long, any sentence under twenty words would be termed short. If a writer habitually used sentences averaging over fifty words his sentences would be conspicuous for their length; if an average of twenty, the reverse would be true. Actually in any writing sentences are very much varied; the more one conformed to an average the more monotonous his writing would be.

Fernald[13] says that "Long and short sentences are relative terms of no definitely established meaning."

Thomas, Manchester and Scott[14] say, "There is no arbitrary limit to the length of a sentence. The writer must consider the class of readers he addresses, and must not construct a sentence too long for them to hold readily in mind."

Since some standard for sentence length was essential in preparing the stories, Brewster's statement was made the basis for an arbitrary selection of the maximum number of words for a short sentence and a minimum number of words for a long sentence. Any sentence containing twenty or fewer words was considered a short sentence; one containing more than twenty words was considered a long sentence. By actual count, it was found that the length of the greater number of sentences in either

11. Gregory, C. A., "The Reading Vocabulary of Third-Grade Children", Journal of Educational Research, VII (February, 1923), p. 127-31.
12. Brewster, William T., English Composition and Style, A Handbook for College Students, p. 228.
13. Fernald, James C., Expressive English, p. 324.
14. Thomas, Joseph M., Manchester, Frederick A., Scott, Franklin W., Composition for College Students, p. 130.

case did not approach this limit of twenty words.

5. Reading of Stories by Experts

After the twenty-seven stories had been prepared, they were submitted to three trained and experienced persons, one representing the field of elementary school supervision, one representing the field of children's literature, and one representing the field of English composition. These persons were asked to read the stories, criticize them and make suggestions for improvement. The suggestions offered by these readers were made the basis for a revision of the stories. The were then made ready for printing.

6. Preparation of Tests and Interest Response Sheet

Objective tests for each of the three stories were prepared. The same tests were used for all nine forms of each story. Two forms of tests were made: Test A, a selection test of ten items covering the main events of the story; and Test B, a true-false test of ten items based on details of the story. It was found that these items, although few in number covered the main facts and most of the details of the story. The vocabulary of the tests was carefully checked so that either words which had been used in the story or words easy for a fourth-grade pupil would be chosen.

In order to get some idea of pupil interest in the stories and to get a general idea of the approximate time it would take to read them, several forms of the stories were presented individually to sixteen fourth-grade pupils and nine fifth-grade pupils of the Jefferson City, Albany, and Kansas City schools.

Most of these pupils were given the comprehension test. The time for reading was noted. Each was asked whether or not he liked the story. He was then asked to give his reasons for liking or disliking it. These reasons were tabulated and used as the basis for the Interest Response Sheet which was to be used in determining pupils' interest in the story. In addition to the reasons given by these pupils, a number of reasons concerned with the form of the story were added to try to determine whether or not fourth-grade pupils consciously gave the form of a story as the cause of their interest.

7. Selection of Form for Printing

In selecting the form for printing, the recommendation of Gray in Summary of Investigations[15] were followed as closely as possible. In view of the fact that definite information concerning some of the factors is lacking, it was thought best to present to the printer two current fourth-grade readers and to ask him to print the stories in the same size type, length line, and size of page.

This procedure would tend to give assurance that those factors named would present no new or unusual difficulties.

8. Selection of Schools

It was desirable to choose for this experiment schools which one might assume had been well classified over a period of years; schools which regularly followed a standardized testing program; schools where there were well-trained teachers; schools where there were large groups of children representing various industries, home conditions, and standards of living; schools representing different sections of the state; and schools where the superintendents and pupils were willing to cooperate in the experiment.

The following Missouri school systems were chosen: Kansas City, Webster Groves, Maplewood, Normandy, St. Louis, Webb City, Maryville, and Jefferson City.

9. Limitations of the Experiment

While the pupils selected may be assumed to be typical fourth-grade pupils from well-classified schools with trained teachers, it is with a full knowledge and a frank acknowledgment

15. Gray, William Scott, Investigations Relating to Reading, p. 202-203.

that there are many varying factors which may, or may not influence the findings resulting from the experiment. Some of them are: individual differences, previous experience, personal likes and dislikes, training of teachers, preference of teacher for certain types of stories, other factors in composition than those used for the study such as choice of words, word order, parts of speech used to qualify meaning as adjectives and adverbs, use of phrases and clauses.

The schools in the Kansas City system presented a situation which probably should be explained here. The elementary school is organized on a basis of seven grades of ten months each. There are two divisions of each grade with mid-year promotion. A grade standard is set up which gives a comparison of a given grade in the Kansas City system with elementary schools completing the work in eight years and those on which most of the standardized tests are based. The grade standard at the close of May was as follows:

Grade in Kansas City School	Grade Standard
3B	3.9
3A	4.5
4B	5.1
4A	5.7

The fourth grade in a typical elementary school at the last of May (the time when the tests were given) would have attained the standard 4.9. None of the grades of the Kansas City schools at that time corresponded to that particular standard. The 3A's were about four months behind, the 4B's two months in advance. It was decided, that the social attainment, the chronological age and the out of school experience of fourth-grade pupils in Kansas City would be similar to fourth-grade pupils in any other system, and so while the majority of cases were taken from 4B groups, some 4A groups were taken. To balance these 4A groups which might rank higher in reading attainment than other fourth graders, an equal number of 3A's were taken, who according to the standards were about half way through the fourth grade.

PRESENTATION OF STORIES

1. Explanation of Symbols

For convenience in referring to the stories and their various forms, certain symbols have been chosen. The letter X represents the animal story, "Numskull and the Rabbit." The letter Y represents the child activity story, "Eggs and Pomegranates." The letter Z represents the Indian story, "Sacajawea, the Bird Woman."

The Roman numeral I indicates narrative form including direct conversation. Roman numeral II indicates narrative form including indirect conversation. Roman numeral III indicates play form.

A combination of long and short, simple, complex, and compound sentences is indicated by the letter a. (For convenience, the term "mixed sentence" is used to indicate this type of sentence.) Short simple sentences are indicated by the letter b. Long complex and compound sentences are indicated by the letter c. Thus YIIc means the story, "Eggs and Pomegranates", written in narrative form with indirect conversation, and containing long complex and compound sentences. These symbols will be used repeatedly during the remainder of this publication.

2. Grouping of Stories

The twenty-seven stories were divided into groups for presentation so that all of the 200 pupils reading each form of the story might not be exposed to the same combination of forms of the other stories. Each of the following groups was presented to 200 or more fourth-grade pupils.

Group One	Group Two	Group Three
XIa	XIb	XIc
YIIa	YIIb	YIIc
ZIIIa	ZIIIb	ZIIIc

Group Four	Group Five	Group Six
XIa	XIIa	XIIIa
YIb	YIIb	YIIIb
ZIc	ZIIc	ZIIIc

Group Seven	Group Eight	Group Nine
XIc	XIIc	XIIIb
YIc	YIIc	YIIIb
ZIc	ZIb	ZIIIb

Group Ten	Group Eleven	Group Twelve
XIb	XIIIa	XIIa
YIb	YIIIa	YIIa
ZIb	ZIIIa	ZIIa

Group Thirteen	Group Fourteen	Group Fifteen
XIIIc	XIIb	XIIb
YIIIc	YIc	YIa
ZIIa	ZIa	ZIIc

Group Sixteen	Group Seventeen	Group Eighteen
XIIIb	XIIIc	XIIc
YIIIc	YIIIa	YIa
ZIa	ZIIb	ZIIb

3. Directions for Presenting Stories and for Giving Tests

The stories were presented to each group of children according to the following instructions. If children appeared restless, a short rest period was given between stories. Sometimes the animal story was presented first, sometimes the child activity story and sometimes the Indian story. By varying the story presented first, there would be an elimination of a preference for any one because it was first story read or last story read.

a. General Directions

Each pupil should be supplied with two sharpened pencils. Additional pencils for emergency should be on the teacher's desk.

In the beginning put the children at ease in the following manner:

One Giving the Test: Today we shall have some fun reading three good stories. Each story has some little tests. These will be fun, too, because they are easy. The grade you make on your test will have nothing to do with the grade which you make here in school.

It is very necessary for each one to do exactly as he is told.

Distribute papers quickly, placing them front page down against the desk so that the last page with space for the name of pupil, etc., is uppermost. While papers are being distributed tell pupils not to pick up the paper until they are told.

One Giving Test: When I say, "Pencils up", hold them up like this. (Show pupils how to hold pencils up, elbow resting on desk.) On the page uppermost on your desk is a place for your name, a place for the name of your school, a place for the grade you are in, and a place to write whether you are in A Class or B Class. (If there is no division of the group into classes, have pupils leave this space vacant.) On the last line is a place for the date which is

_____.

(Write date on board.)
When you have finished writing these things, put your pencils down and wait for further directions. Do your work quickly. Pencils up. Write.

After pupils have written the necessary information give the following directions:

One Giving Test: The first story is

_____

(Write name of story on board.)
There may be a few words you do not know. I will help you with those before you begin. (See Specific Directions.) If there are other words you do not know, skip them and go right on reading.

The same story should not always be given first. For example, to one group give the X story first; to another, the Y story; and to a third group give the Z story first.

One Giving Test: When I say, "Begin", turn your papers over like this (show how paper is to be turned) and begin to read at once. When you have finished one page go right on to the next. When I say, "Check", with your pencil make a large check mark like this (place check mark on the board) above the word you are reading when I say, "Check." After you have made a check mark, lay your pencil on your desk and go right on reading until you have finished the story. Read quickly, but carefully, so that you may know the story well. When you have finished the story turn your paper down on the desk and wait until I tell you what to do next. You will know when you have come to the end of the story by this heavy black line. (Show line.) Pencils up. Begin.

After pupils have read for two minutes (use stop watch or watch with second hand) say, "Check."

While the pupils are finishing the story, place an example of an item from a selection test on the board, also an example of an item from a true-false test, such as

Numskull was
☐ a rabbit
☐ a lion
☐ a man
☐ a chicken

Numskull pushed the rabbit into the well.
true false

When pupils have finished reading the story, by means of the example make sure they understand how to take the tests.

One Giving Test: When I say, "Begin", turn your papers over and take Test A. When you have finished, do Test B. Do not turn back to the story while you are taking the test. Do not guess. If you do not know the answer to a question, skip it and go to the next. Pencils up. Begin.

When the three stories have been completed, quickly distribute the sheet for interest response. Place the side which has space for name of pupil, etc., uppermost.

Direct pupils to fill in blanks at the top of the page.

One Giving Test: I would like to know which story you like best. (Read aloud, while pupils read silently, the directions given on the page.) Pay no attention to what others write. Begin.

Allow ample time for checking, (about 3 minutes.)

One Giving Test: Turn papers. I would like to know which story you did not like, or the one which you liked least. (Read with pupils directions for checking the story they like least.) Pay no attention to what others write. Begin.

b. Specific Directions

Directions for X Story

One Giving Test: This story is called "Numskull and the Rabbit." (Write the word Numskull on the board.) A Numskull is a stupid or foolish person. Pencils up. Begin.

Directions for Y Story

One Giving Test: This story happened a long time ago in a very old country across the ocean. It is called "Eggs and Pomegranates." (Write the word pomegranate on the board.) A pomegranate is a kind of fruit. It has a hard rind or skin and looks something like an orange. The pulp is crimson, or, when very ripe, a dark purplish red, and it is very juicy. (Write the word Tyre on the board.) Tyre is the name of a city. (Write the word Syrian on the board.)

A Syrian is a person who lives in a country called Syria.

Directions for Z Story

One Giving Test: This story is called, "Sacajawea, the Bird Woman." Here are the names of some Indian people: (Write Sacajawea.) This is Sacajawea, the name of an Indian woman. (Write Camehwait.) This is Cameahwait, the name of an Indian chief. Here are the names of two Indian tribes: (Write Shoshonee) Shoshonee, (Write Mandan) and Mandan. Here is a French name. (Write Charboneau.) Charboneau is Sacajawea's husband. Here are some other names in the story. (Write and pronounce

Thomas Jefferson William Clark
Meriwether Lewis.)

Here are the names of two places. A city (write and pronounce St. Louis) and a state (write and pronounce Montana).

Directions for a Play

One Giving Test: This story is written like a play, such as you sometimes put on here at school. First are the names of the characters, or people in the play, then the number of the act or scene, then the play itself. The name of the person speaking appears each time before what he says. What the people do, and explanations are placed within parentheses marks like this:

(.)
Place on board.

PRESENTATION AND INTERPRETATION OF THE RESULTS OF THE EXPERIMENT

1. A Presentation of the Results of the Interest Response to Nine Forms of Each of Three Stories

The purpose of this section is to present the results of the experiment with regard to the influence of the three chosen forms of composition and the three chosen kinds of sentence on the interest of 1800 fourth-grade pupils.

After each pupil had read the three stories, he was given the interest response sheet. On this he was asked to check the story he liked most, then to check in the appropriate column the reason why he liked it; or, if the reason was not given, to write his own reason at the bottom of the page. Pupils were directed to do the same with regard to the story they liked least.

In tabulating results, it was found that nineteen pupils failed to indicate the story liked most and eleven failed to indicate the story liked least. So, while the stories were presented to 1800 pupils, the facts concerning the interest of fourth-grade pupils in the chosen stories are based on 1781 responses to the story liked most and 1789 responses to the story liked least.

Since the pupils (with the exception of eight) who responded to a story liked most also responded to a story liked least, each group of responses should serve as a check on the facts shown by the other.

Table I presents a summary of pupils' choices with regard to the story liked most and the story liked least.

In observing the total responses to the story liked most in Table I, one finds that 653 pupils (which is 36.666 per cent) liked the Y stories most; 575 (32.285 per cent) liked the Z stories; 553 (31.049 per cent) liked the X stories. This indicates that, taking the stories as a whole, pupils liked the child activity stories best, the Indian stories next, and the animal stories least.

From the total responses to the story liked least, one finds that 688 pupils (38.457 per cent) liked the Z story least; 668 (37.339 per cent) liked the X story least; and 433 (24.203 per cent) liked the Y stories least.

The results in both cases indicate that the greatest number of pupils liked the child activity story most; however, there is not a complete agreement as to whether the X story or the Z story is the one liked least. The difference in percentage between the number of choices for the X and Z stories is small in each case. This fact and the

Table I

SUMMARY OF INTEREST RESPONSES TO ALL STORIES

	Number of responses to the story liked most				Number of responses to the story liked least			
Form of story	X Story	Y Story	Z Story	TOTAL	X Story	Y Story	Z Story	TOTAL
Ia	62	85	56	203	66	46	85	197
Ib	58	86	77	221	74	41	64	179
Ic	60	73	76	209	86	50	65	201
IIa	70	41	73	184	67	67	64	198
IIb	65	82	52	199	55	41	88	184
IIc	48	59	70	177	94	53	72	219
IIIa	69	90	53	212	75	36	94	205
IIIb	76	65	58	199	63	51	79	193
IIIc	45	72	60	177	88	48	77	213
TOTAL	553	653	575	1781	668	433	688	1789

Table II

STORIES ARRANGED ACCORDING TO RANK IN CHOICE OF STORIES LIKED MOST

From responses to story liked most			From responses to story liked least		
Rank	Form of Story	Number responding	Rank	Form of story	Number responding
1	Ib	221	1	Ib	179
2	IIIa	212	2	IIb	184
3	Ic	209	3	IIIb	193
4	Ia	203	4	Ia	197
5	IIb-IIIb	199-199	5	IIa	198
6	" "		6	Ic	201
7	IIa	184	7	IIIa	205
8	IIc-IIIc	177-177	8	IIIc	213
9	" "		9	IIc	219
TOTAL		1781			1789

fact that in the responses to the story liked most the percentage responding to each story is so nearly the same adds some strength to the assumption at the beginning of the experiment, that fourth-grade pupils would be equally interested in the three types of stories.

In Table II the stories are arranged according to rank as indicated by preference of pupils. In the responses to the story liked most, the type of story receiving the greatest number of choices is ranked first; the one receiving the fewest choices is ranked last. The order is reversed in the responses to the story liked least, since the type of story with the fewest number of votes as the one liked least would rank first as a type of story liked most.[16]

16. For convenience in observing ranking, this procedure is used in Tables II to X inclusive.

There is no considerable agreement in the ranking of stories in the two groups. The table does indicate, however, that, taking all the stories into consideration, the type of story chosen by the greatest number of pupils as their favorite is that containing direct conversation and written in short simple sentences. The two types of story liked least are those containing indirect conversation with long complex and compound sentences, and those in play form with long, complex and compound sentences.

In order to obtain a more accurate account of the influence of the factors chosen on the interest of fourth-grade pupils, an analysis is made of the interest response to each story.

a. An Analysis of the Interest Responses to the Story, "Numskull and the Rabbit"

It is proposed to determine the influence of the chosen forms of story and the chosen kinds of sentence on the interest of fourth-grade pupils on the basis of the following assumptions: If the form of the story is held constant while the kind of sentences varies, and a story containing one kind of sentence consistently receives the highest ranking as the story liked most, it would appear that these fourth-grade pupils were most interested in a story written in that particular kind of sentence. If the kind of sentence is held constant while the form of story varies, and one form of story consistently receives the greatest number of votes, that form of story would seem to be preferred.

This same reasoning is also applied to the results of the responses to the story liked least.

Table III shows the results of the interest responses to the animal story when the form of the story is kept constant and the kind of sentences varies.

When the story contains direct conversation, the results of the response to the story liked most show that the story with mixed sentences ranks first; the one with long complex and compound sentences ranks second; the one with short simple sentences ranks third. The results of the response to the story liked least show that the story with mixed sentences ranks first; the story with short simple sentences, second; the story with long complex and compound sentences, third. (It should be remembered that the rank in the results of the responses to the story liked least is always the reverse of the rank assigned to the results of the story liked most. That is, first rank is given to the fewest number of responses instead of the greatest number, etc.) There is agreement in ranking between the two groups of results only in the first rank which is assigned to the story with mixed sentences.

In stories containing indirect conversation, in the response to story liked most, the story with mixed sentences ranks first; the one with short simple sentences ranks second; the one with long complex and compound sentences ranks third. In the response to the story liked least, the ranking is as follows: short simple sentences, first; mixed sentences, second; long complex and compound sentences, third. The only agreement between these two groups of results is that the story with long complex and compound sentences is liked by the fewest number of pupils.

When the stories are written in play form, the response to the story liked most gives first rank to short simple sentences, second to mixed sentences, third to long complex and compound sentences. The response to the story liked least shows the following ranking: short simple sentences, first; mixed sentences, second; long complex and compound sentences, third. These two rankings agree.

When the form of the story is held constant, the six sets of data show that the story with mixed sentences ranks first three times and the story with short simple sentences ranks first three times. The story with long complex and compound sentences ranks third in five of the six cases.

In this story, it appears that

Table III

RESULTS OF INTEREST RESPONSE TO THE ANIMAL STORY WHEN THE FORM OF STORY IS CONSTANT

Response to story liked most				Response to story liked least			
Form of story	Kind of sentences	Number responses	Per cent responses	Form of story	Kind of sentences	Number responses	Per cent responses
Direct conversation	Mixed	62	34.444	Direct conversation	Mixed	66	29.203
Direct conversation	Long complex and compound	60	33.333	Direct conversation	Short simple	74	32.743
Direct conversation	Short simple	58	32.222	Direct conversation	Long complex and compound	86	38.053
Total		180	99.999	Total		226	99.999
Indirect conversation	Mixed	70	38.251	Indirect conversation	Short simple	55	25.462
Indirect conversation	Short simple	65	35.519	Indirect conversation	Mixed	67	31.018
Indirect conversation	Long complex and compound	48	26.229	Indirect conversation	Long complex and compound	94	43.518
Total		183	99.999	Total		216	99.998
Play	Short simple	76	40.000	Play	Short simple	63	27.876
Play	Mixed	69	36.315	Play	Mixed	75	33.185
Play	Long complex and compound	45	23.684	Play	Long complex and compound	88	38.938
Total		190	99.999	Total		226	99.999

fourth-grade pupils like stories with mixed sentences or with short simple sentences equally well. They like stories with long complex and compound sentences least.

The totals in the response to the story liked most indicate 190 pupils chose a story written in play form, 183 chose indirect conversation; 180 chose direct conversation. In the response to the story liked least, the same number of pupils, 226, liked least a story written in play form or in direct conversation. The fewest number, 216, chose a story with indirect conversation. These two sets of data do not show agreement. There is a difference of only ten cases between the largest total and the smallest one.

The results of the interest response to the animal story when the kind of sentences is constant may be seen in Table IV.

Table IV

RESULTS OF INTEREST RESPONSE TO THE ANIMAL STORY WHEN THE KIND OF SENTENCE IS CONSTANT

Response to story liked most				Response to story liked least			
Kind of sentence	Form of story	Number responses	Per cent responses	Kind of sentence	Form of story	Number responses	Per cent responses
Mixed	Indirect conversation	70	34.825	Mixed	Direct conversation	66	31.730
Mixed	Play	69	34.328	Mixed	Indirect conversation	67	32.211
Mixed	Direct conversation	62	30.845	Mixed	Play	75	36.057
Total		201	99.998	Total		208	99.998
Short simple	Play	76	38.191	Short simple	Indirect conversation	55	28.645
Short simple	Indirect conversation	65	32.663	Short simple	Play	63	32.812
Short simple	Direct conversation	58	29.145	Short simple	Direct conversation	74	38.541
Total		199	99.999	Total		192	99.998
Long complex and compound	Direct conversation	60	39.215	Long complex and compound	Direct conversation	86	32.089
Long complex and compound	Indirect conversation	48	31.372	Long complex and compound	Play	88	32.835
Long complex and compound	Play	45	29.411	Long complex and compound	Indirect conversation	94	35.074
Total		153	99.998	Total		268	99.998

In the stories containing mixed sentences, the results of the response to the story liked most show that the story containing indirect conversation ranks first; the one written in play form, second; the one containing direct conversation, third. In the response to the story liked least, the story with direct conversation ranked first; the one with indirect conversation, second; the play, third. There is no agreement in the data of the response to the story liked most and those of the response to the story liked least.

The play ranks first; indirect conversation, second; and direct conversation, third in the stories containing short simple sentences in the response to the story liked most. Indirect conversation ranks first; the play, second; direct conversation, third in the same group in the response to the story liked least. The only agreement in the ranking of the two sets of data is in the third rank.

In the stories containing long complex and compound sentences, the results of the response to the story liked most give first rank to the story with

Table V

RESULTS OF INTEREST RESPONSE TO THE CHILD ACTIVITY STORY WHEN THE FORM OF STORY IS CONSTANT

Response to story liked most				Response to story liked least			
Form of story	Kind of sentences	Number responses	Per cent responses	Form of story	Kind of sentences	Number responses	Per cent responses
Direct conversation	Short simple	86	35.245	Direct conversation	Short simple	41	29.927
Direct conversation	Mixed	85	34.836	Direct conversation	Mixed	46	33.576
Direct conversation	Long complex and compound	73	29.918	Direct conversation	Long complex and compound	50	36.496
Total		244	99.999	Total		137	99.999
Indirect conversation	Short simple	82	45.054	Indirect conversation	Short simple	41	25.465
Indirect conversation	Long complex and compound	59	32.417	Indirect conversation	Long complex and compound	53	32.919
Indirect conversation	Mixed	41	22.527	Indirect conversation	Mixed	67	41.614
Total		182	99.998	Total		161	99.998
Play	Mixed	90	39.647	Play	Mixed	36	26.666
Play	Long complex and compound	72	31.718	Play	Long complex and compound	48	35.555
Play	Short simple	65	28.634	Play	Short simple	51	37.777
Total		227	99.999	Total		135	99.998

direct conversation, second rank to the one with indirect conversation, and third rank to the one written in play form. The results of the response to the story liked least show the following ranking: direct conversation first, play second, indirect conversation third. The only agreement in these two groups of data is in the first ranking.

In the animal story, when the kind of sentence is constant, there is practically no evidence that any one form of story is liked most. Out of the six cases, direct conversation ranks first three times and third three times; indirect conversation ranks first twice and third once; play form ranks first once and third twice.

The totals in the response to story liked most show that 201 pupils chose a story with mixed sentences; 199 chose a story with short simple sentences; 153 chose a story with long complex and compound sentences. The totals in the response to the story liked least agree only in the case of the stories with long complex and compound sentences.

In the animal story, pupils appear to be most interested in the story written in either short simple sentences or mixed sentences, and least interested in stories containing long complex and compound sentences. The pupils do not definitely appear to be interested in any one form of story more than another.

b. An Analysis of the Interest Responses to the Story, "Eggs and Pomegranates"

The results of the interest response to the child activity story when the form of story is constant and the kind of sentence varies are presented in Table V.

The following ranking occurs in the response to the story liked most when the story contains direct conversation: short simple sentences first, mixed sentences second, long complex and compound sentences third. The ranking in the response to the story liked least is the same.

In the stories written in indirect conversation form, the responses to

Table VI

RESULTS OF INTEREST RESPONSE TO THE CHILD ACTIVITY STORY WHEN THE KIND OF SENTENCE IS CONSTANT

Response to story liked most				Response to story liked least			
Kind of sentence	Form of story	Number responses	Per cent responses	Kind of sentence	Form of story	Number responses	Per cent responses
Mixed	Play	90	41.666	Mixed	Play	36	24.161
Mixed	Direct conversation	85	39.351	Mixed	Direct conversation	46	30.872
Mixed	Indirect conversation	41	18.981	Mixed	Indirect conversation	67	44.966
Total		216	99.998	Total		149	99.999
Short simple	Direct conversation	86	36.909	Short simple	Direct conversation	41[1]	30.827[1]
Short simple	Indirect conversation	82	35.193	Short simple	Indirect conversation	41	30.827
Short simple	Play	65	27.896	Short simple	Play	51	38.345
Total		233	99.998	Total		133	99.999
Long complex and compound	Direct conversation	73	35.784	Long complex and compound	Play	48	31.788
Long complex and compound	Play	72	35.294	Long complex and compound	Direct conversation	50	33.112
Long complex and compound	Indirect conversation	59	28.921	Long complex and compound	Indirect conversation	53	35.099
Total		204	99.999	Total		151	99.999

1. Direct conversation and indirect conversation have the same rank.

the story liked most give the story with short simple sentences first rank, the one with long complex and compound sentences second, the one with mixed sentences third. The response to the story liked least agrees in each case with this ranking.

In the stories written in play form, the response to the story liked most indicates that the story with mixed sentences ranks first; the one with long complex and compound sentences ranks second; the one with short sentences, third. The results of the response to the story liked least show an agreement in ranking.

According to Table V, stories with short simple sentences ranked first in four out of six cases. Stories with mixed sentences ranked first in the other two cases. There seems to be no agreement in results as to the story liked least, as long complex and compound sentences ranked third in two out of six cases; mixed sentences ranked third in two cases; short simple sentences ranked third in two cases.

One observes from the totals that 244 pupils chose a story written in direct conversation; 227 chose a story in play form; 182 chose a story containing indirect conversation. In the response to the story liked least, there is no agreement in ranking of totals except in the case of stories containing indirect conversation.

Table VI indicates the results of the interest response to the child activity story when the kind of sentence is constant and the form of story varies.

In the response to the story liked most when the stories contain mixed sentences, play form ranks first; direct conversation, second; and indirect conversation, third. The response to the story liked least presents the same ranking.

Direct conversation ranks first; indirect conversation, second; and play form, third in the response to the story liked most when the stories are written in short simple sentences. In the response to the story liked least, direct conversation and indirect conversation have the same ranking. The story written in play form ranks third, agreeing with the ranking in the response to the story liked most.

In the group of stories containing long complex and compound sentences, the results of the response to the story liked most places the direct conversation form first, play form second, and indirect conversation third. The responses to the story liked least disagree slightly in this ranking in that the play form is first; direct conversation, second; and indirect conversation, third. Since there is a difference of only one case in one instance and of two cases in the other, it would seem that the two forms, play and indirect conversation, rank practically the same.

When the kind of sentence is constant, play form ranks first three times out of six. Direct conversation ranks first in three out of six cases. Indirect conversation ranks third in four cases out of six. Play form ranks third in two out of six cases.

The totals in the response to the story liked most show that 233 pupils chose a story written in short simple sentences; 216 chose a story written in mixed sentences; and 204 chose a story written in long complex and compound sentences. The totals in the response to the story liked least agree in the ranking of the three groups of stories.

In the child activity story, pupils liked stories written in short simple sentences best. This is true both in the totals indicated in Table VI and in the analysis of the data of Table V. There is no agreement as to the kind of sentence liked least. The pupils appear to be almost equally interested in stories containing direct conversation and in those written in play form, with perhaps a slight indication that they prefer stories with direct conversation. They seem to be least interested in stories containing indirect conversation. These facts are indicated both in the analysis of Table VI and in the totals of Table V.

Table VII

RESULTS OF INTEREST RESPONSE TO THE INDIAN STORY WHEN THE FORM OF STORY IS CONSTANT

Responses to story liked most				Responses to story liked least			
Form of story	Kind of sentence	Number responses	Per cent responses	Form of story	Kind of sentence	Number responses	Per cent responses
Direct conversation	Short simple	77	36.842	Direct conversation	Short simple	64	29.906
Direct conversation	Long complex and compound	76	36.363	Direct conversation	Long complex and compound	65	30.373
Direct conversation	Mixed	56	26.794	Direct conversation	Mixed	85	39.719
Total		209	99.999	Total		214	99.998
Indirect conversation	Mixed	73	37.435	Indirect conversation	Mixed	64	28.571
Indirect conversation	Long complex and compound	70	35.897	Indirect conversation	Long complex and compound	72	32.142
Indirect conversation	Short simple	52	26.666	Indirect conversation	Short simple	88	39.285
Total		195	99.998	Total		224	99.998
Play	Long complex and compound	60	35.087	Play	Long complex and compound	77	30.800
Play	Short simple	58	33.918	Play	Short simple	79	31.600
Play	Mixed	53	30.994	Play	Mixed	94	37.600
Total		171	99.999	Total		250	100.000

c. An Analysis of the Interest Responses to the Story, "Sacajawea, The Bird Woman"

The results of the interest response to the Indian story when the form of the story is constant and the kind of sentence varies are presented in Table VII.

The story with short simple sentences ranks first; the one with long complex and compound sentences ranks second; and the one with mixed sentences ranks third in the response to the story liked most when the story contains direct conversation. The same ranking occurs in the response to the story liked least.

In the response to the story liked most when the stories are written in indirect conversation, the story with mixed sentences was chosen by the greatest number of pupils; that with long complex and compound sentences, by the next greatest number; and that with short simple sentences was chosen by the fewest number of pupils. The data for the response to the story liked least agree in each case.

The story with long complex and compound sentences ranks first in the

Table VIII

RESULTS OF INTEREST RESPONSE TO THE INDIAN STORY WHEN THE KIND OF SENTENCE IS CONSTANT

Response to story liked most				Response to story liked least			
Kind of sentence	Form of story	Number responses	Per cent responses	Kind of sentence	Form of story	Number responses	Per cent responses
Mixed	Indirect conversation	73	40.109	Mixed	Indirect conversation	64	26.337
Mixed	Direct conversation	56	30.769	Mixed	Direct conversation	85	34.979
Mixed	Play	53	29.120	Mixed	Play	94	38.683
Total		182	99.998	Total		243	99.999
Short simple	Direct conversation	77	41.176	Short simple	Direct conversation	64	27.705
Short simple	Play	58	31.016	Short simple	Play	79	34.199
Short simple	Indirect conversation	52	27.807	Short simple	Indirect conversation	88	38.095
Total		187	99.999	Total		231	99.999
Long complex and compound	Direct conversation	76	36.893	Long complex and compound	Direct conversation	65	30.373
Long complex and compound	Indirect conversation	70	33.980	Long complex and compound	Indirect conversation	72	33.644
Long complex and compound	Play	60	29.126	Long complex and compound	Play	77	35.981
Total		206	99.999	Total		214	99.998

response to the story liked most when the stories are in play form; the story with short simple sentences ranks second; and the one with mixed sentences ranks third. The results in the response to the story liked least agree with this ranking.

According to these data, pupils do not seem to prefer any one kind of sentence, since a story with short simple sentences ranks first two times, one with mixed sentences ranks first two times, one with long complex and compound sentences ranks first two times. Mixed sentences rank third in four out of six cases.

The totals in Table VII indicate that 209 pupils chose stories written in direct conversation, 195 chose those written in indirect conversation, and 171 chose play form. The totals for the response to the story liked least represent the same order of ranking.

In Table VIII may be seen the results of the interest response to the Indian story when the kind of sentence is constant.

In the group of stories containing mixed sentences, indirect conversation ranks first, direct conversation

second, and play form third in the response to the story liked most. The same ranking occurs in the response to the story liked least.

Direct conversation is first, play form second, and indirect conversation third in rank in the response to the story liked most in the group of stories containing short simple sentences. Data for the response to the story liked least agree with this order of ranking.

Direct conversation is first, indirect conversation second, and play form is third in rank in the response to the story liked most when the stories contain long complex and compound sentences. In the response to the story liked least the data agree.

Direct conversation ranks first in four out of six cases; indirect conversation, in two. Play form ranks third in four out of six cases; indirect conversation ranks third in two out of six cases.

The totals in Table VIII in response to the story liked most show 206 pupils preferring stories written in long complex and compound sentences, 187 choosing those with short simple sentences, and 182 choosing those with mixed sentences. This order is the same in the totals of the response to the story liked least.

In the Indian story, there is no evidence that pupils prefer stories with any one kind of sentence. They seem to like the stories with mixed sentences least, as this type of sentence ranks third in four cases out of six. This latter statement agrees with the total figure in Table VIII; however, there is but little indication in the analysis of Table VII that pupils like stories with long complex and compound sentences best as is indicated by the totals in Table VIII. Pupils prefer direct conversation and like play form least. This agrees with the facts indicated by the totals in Table VII.

In the interest response to the nine forms of each of three stories, there is no one form of story or kind of sentence which consistently ranks first in pupils' choice. Indeed, one notices the slight differences between the number of responses rather than great differences. The percentage is within the thirties in the majority of cases. The results lead one to conclude that the interest of these fourth-grade pupils was not greatly affected by the forms of story nor by the kinds of sentence chosen. However there are some rather definite tendencies which are significant and which may be shown best through tables.

Table IX

SUMMARY OF HIGHEST AND LOWEST RANKING STORIES ACCORDING TO PUPILS' CHOICES WHEN THE FORM OF STORY IS CONSTANT

Story	Ranking	Ranking from results of response to story liked most			Ranking from results of response to story liked least		
Animal story	Highest	Ia	IIa	IIIb	Ia	IIb	IIIb
	Lowest	Ib	IIc	IIIc	Ic	IIc	IIIc
Child activity story	Highest	Ib	IIb	IIIa	Ib	IIb	IIIa
	Lowest	Ic	IIa	IIIb	Ic	IIa	IIIb
Indian story	Highest	Ib	IIa	IIIc	Ib	IIa	IIIc
	Lowest	Ia	IIb	IIIa	Ia	IIb	IIIa

From Table IX one may see that the ranking from the results of response to the story liked least agrees with the ranking from the results of response to the story liked most in all except two cases. The table also reveals the following facts:

Stories with mixed sentences rank highest seven times.
Stories with mixed sentences rank lowest six times.
Stories with short simple sentences rank highest nine times.
Stories with short simple sentences rank lowest five times.
Stories with long complex and

compound sentences rank highest two times.
Stories with long complex and compound sentences rank lowest seven times.

From the facts concerning the highest ranking stories, one may conclude that the pupils in this study were most interested in stories containing short simple sentences; that stories containing a mixture of long and short, simple, complex, and compound sentences were second in their interest; and that they were least interested in stories with long complex and compound sentences.

The facts concerning the lowest ranking indicate little difference in the interest in the three stories. It appears that while the pupils have chosen one type of story most frequently as the one they liked best, there is no one type of story which stands out noticeably as the one liked least.

Stories containing direct conversation rank highest ten times.
Stories containing direct conversation rank lowest three times.
Stories containing indirect conversation rank highest five times.
Stories containing indirect conversation rank lowest seven times.
Stories written in play form rank highest four times.
Stories written in play form rank lowest eight times.

The facts indicated by both the highest and the lowest ranking lead to the conclusion that the fourth-grade pupils in this study preferred stories containing direct conversation and that they were least interested in stories written in play form and those containing indirect conversation.

The interpretation of Tables IX and X agrees with the results of Table II. The evidence presented in these tables shows there is a tendency for the pupils to whom the stories were submitted to be most interested in a story written in short simple sentences and containing direct conversation. They were least interested in stories written in long complex and compound sentences and in stories written in play form or in a form containing indirect conversation.

Table X

SUMMARY OF HIGHEST AND LOWEST RANKING STORIES ACCORDING TO PUPILS' CHOICES WHEN THE KIND OF SENTENCE IS CONSTANT

Story	Ranking	Ranking from results of response to story liked most			Ranking from results of response to story liked least		
Animal story	Highest	IIa	IIIb	Ic	Ia	IIb	Ic
	Lowest	Ia	Ib	IIIc	IIIa	Ib	IIc
Child activity story	Highest	IIIa	Ib	Ic	IIIa	Ib-IIb	IIIc
	Lowest	IIa	IIIb	IIc	IIa	IIIb	IIc
Indian story	Highest	IIa	Ib	Ic	IIa	IIIb	Ic
	Lowest	IIIa	IIb	IIIc	IIIa	IIb	IIIc

One observes from Table X that the ranking according to the results of response to the story liked least does not agree with the ranking according to results of response to story liked most in a number of cases; therefore the two groups of data do not serve as a check on each other as did those in Table IX. The following facts, however, are evident in Table X:

d. A Study of Pupils' Reasons for Interest or Lack of Interest in a Story

Table XI

PUPILS' REASONS FOR LIKING AND FOR NOT LIKING THE STORY, "NUMSKULL AND THE RABBIT"

Reason for liking story	Number giving reason	Reason for not liking story	Number giving reason
The rabbit played a good trick on the lion	182	Numskull was too cruel	242
Numskull was punished for being so cruel	117	The story could not have happened	133
It is an interesting story	74	The story was not interesting	111
I like animal stories	70	I do not like animal stories	74
I like to read stories in which animals talk	30	I do not like stories in which animals talk	40
It is funny	28	I do not like the characters in the story	13
I like a story that describes what happens	18	I do not like to read a story which describes what happens	8
I like the characters in the story	4	The story was hard to read	7
The story is easy to read	2	I do not like to read plays	6
I like to read plays	2	No reason given	19
No reason given	26	Original reasons	15
Original reason	0		
Total	553	Total	668

Typical Original Reasons

It was silly Too sissy
He was selfish
It is fit for a baby
Do not like to read stories over
Numskull was so foolish
Do not like for animals to be killed
Couldn't get any sense out of it

Table XII

PUPILS' REASONS FOR LIKING AND FOR NOT LIKING THE STORY, "EGGS AND POMEGRANATES"

Reason for liking story	Number giving reason	Reason for not liking story	Number giving reason
Samuel was punished for being so rude	154	Boys should not fight	152
It is an interesting story	127	It is not an interesting story	87
It is a good fight	89	The story does not explain the fight well enough	68
It is funny	76	It was not a good fight	58
Ruth tries to keep David from fighting	61	I do not like stories about children	15
I like a story that describes what happens	44	I do not like the characters in the story	10
It is about children	37	I do not like a story that describes what happens	9
I like to read stories in which people talk	9	I do not like to read plays	6
I like to read plays	5	The story is hard to read	5
It is easy to read	4	I do not like stories in which people talk	1
I like the characters in the story	3	No reason given	15
No reason given	42	Original reasons	7
Original reasons	2		
Total	653	Total	433

Typical Original Reasons

David took up for Ruth (a statement not true according to the story)
It is about a lame boy

Typical Original Reasons

Not a fair fight
Do not like fighting stories
Do not like stories about lame people
The big boy fought the lame boy
Ending didn't sound right

Table XIII

PUPILS' REASONS FOR LIKING AND FOR NOT LIKING THE STORY, "SACAJAWEA, THE BIRD WOMAN"

Reason for liking story	Number giving reason	Reason for not liking story	Number giving reason
I like stories about Indians	161	I do not like stories about Indians	177
The story is about history	148	The story is not interesting	137
It is an interesting story	89	I do not like stories about grown people	99
Sacajawea found her people again	48	I do not like stories about history	82
Sacajawea was so brave	48	The story is hard to read	48
It was unusual for an Indian woman to be a guide	30	I do not like the characters in the story	35
I like a story that describes what happens	15	I do not like a story that describes what happens	29
I like to read plays	5	I do not like to read plays	25
I like to read stories in which people talk	5	I do not like to read stories in which people talk	10
I like the characters in the story	3	No reason given	38
The story is easy to read	2	Original reason	8
No reason given	17		
Original reason	4		
Total	575	Total	688
Typical Original Reasons		Typical Original Reasons	
Sacajawea helped our country		Story didn't tell enough	
It had Thomas Jefferson in it		Had nothing funny in it	
		Don't like that kind of story	
		Too short	
		Do not know names	
		Names too funny	
		Too many hard words	
		It is about a woman	
		Do not get any sense out of story	

One notices in a study of pupils' reasons for liking a story most, as presented in Tables XI, XII, XIII, that in the animal story and in the child activity story, the largest number of pupils gave as a reason for liking the story one which had to do with the plot of the story. In the Indian story, the largest number of pupils gave as their reason for preference, that it was an Indian story or that it was a history story.

In the results of pupils' reasons for liking a story least, a retribution element appears in the reason given by the largest number of pupils in both the animal story and the child activity story. The fact that they did not like Indian stories was given most often by pupils as the reason for not liking the Indian story.

Only eight pupils gave as their reason for liking a story, "The story was easy to read."

A somewhat different result is found in the reasons for liking the story least, as sixty gave as their reason, "The story was hard to read." It is noted that forty-eight of these responses were given to the Indian story. When one studies the vocabulary facts of the story, it is evident that the Indian proper names are responsible for so many pupils giving this reason.

Aside from this one situation, the difficulty or lack of difficulty of a reading selection seemed to have little influence on the interest of pupils in this study.

An attempt was made to determine whether the form of the story influenced pupils' interest by listing such reasons as the following: "I like to read plays", "I like to read stories in which people (or animals) talk", "I like a story which describes what happens." In all the stories, only 133 pupils responded to these three reasons for liking the story best. Of the twelve who said they liked to read plays, only four actually responded to play form. Three had read a story written in direct conversation; five had

read a story written in indirect conversation.

Of the forty-four who gave as their reason for liking the story best, "I like to read stories in which people talk", eleven read stories written in direct conversation; twelve read stories written in indirect conversation; twenty-one had read plays.

Of the seventy-seven who gave as their reason for liking the story best, "I like a story that describes what happens", twenty-two had read a story containing indirect conversation; twenty-six had read a story with direct conversation; twenty-nine had read a story written in play form.

A study of similar responses to the story liked least shows the following facts: 134 pupils responded to, "I do not like to read plays", "I do not like stories in which people (or animals) talk", "I do not like to read a story which describes what happens", as reasons for not liking a story.

Of the thirty-seven pupils giving the reason, "I do not like to read plays", twenty-five had read plays, six had read stories with direct conversation, six had read stories with indirect conversation.

Of the fifty-one pupils who gave as their reason for not liking the story, "I do not like to read stories in which people talk", eleven had read stories containing direct conversation; sixteen had read stories containing indirect conversation; twenty-three had read plays.

Of the forty-six pupils who gave as their reason for not liking the story, "I do not like to read a story which describes what happens", twelve had read a story containing indirect conversation; sixteen had read a story containing direct conversation; eighteen had read a play.

The number of pupils who indicated the form of the story as their reason for liking or disliking it is comparatively small. Of those who did give the form of the story as a reason for liking it, only 27.81 per cent responded correctly to the form of the story. Of those who indicated the form of the story as a reason for not liking it, 35.82 + per cent responded correctly as to the form of the story.

In this study it seems that the interest of fourth-grade pupils is not consciously influenced by the form of the story to any appreciable extent.

2. An Interpretation of the Comprehension Scores Obtained from Objective Tests Based upon the Content of Three Basic Stories

The purpose of this section is to determine the influence of certain factors in style of composition on the reading comprehension of fourth-grade pupils by interpreting the results of objective tests based on the content of the three selected stories.

The comprehension scores are interpreted and ranked in terms of the average score, or arithmetic mean. It is assumed that the story producing the highest average score, as determined by objective tests, is the one which pupils can best understand. It is also assumed that the two hundred comprehension scores for each of the twenty-seven stories represent a normal frequency distribution. A plotting of a graph of the scores for several of the stories gave evidence that this assumption could be made with a reasonable degree of certainty.

Groups of three stories each with either the story form or the kind of sentence constant are considered. The story with the highest average score is assigned the highest rank in each group; the one with the lowest average score is given the lowest rank. If one particular form of story or kind of sentence consistently ranks highest in all groups, it is assumed that this form of story or kind of sentence will produce the best comprehension on the part of fourth-grade pupils.

In order to make as accurate comparison as possible of the average scores in each group, the standard deviation, reliability of the mean (average), and the significance of the difference

between averages were calculated.

The results of the comprehension scores with their interpretation are given on the following pages.

Table XIV

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF XI STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
XIa	12.880	4.557	.322
XIb	12.880	3.609	.255
XIc	13.255	4.089	.289

By observation of Table XIV, one sees that the average score for the animal story containing direct conversation and written in long complex and compound sentences (XIc) is the highest of the three average scores. However, in order to determine an accurate ranking of the averages of the three groups of scores, it is necessary to use a statistical procedure. This is done by determining the significance of the difference between the average scores.

The difference (indicated by the symbol D) between the obtained average of story XIc and the obtained average of XIa is .375. The reliability of this obtained difference is calculated by the use of the formula

$$\sigma_{(diff.)} = \sqrt{\sigma^2_{(av.^1)} + \sigma^2_{(av.^2)}}.$$

Applying this formula, the reliability of the obtained difference is equal to

$$\sqrt{.289^2 + .322^2} \text{ or } .432.$$

Dividing the difference in the obtained averages by the reliability of the average (mean), the result is .86. By referring to a table,[17] one finds that this may be interpreted to mean there are 80 chances in 100 that the obtained difference between the average score of story XIc and the average score of story XIa represents a true difference greater than zero. (There are, also, 20 chances in 100 that the true difference is less than zero.) This is called the significance of the difference.

By applying the same procedure to the data for stories XIc and XIb, one obtains the following results:

$$D = .375$$

Reliability of the difference = .385.

$$\frac{D}{\sigma_{(diff)}} = .97 \text{ or } 83 \text{ chances in } 100$$

There are, then, 83 chances in 100 that the obtained difference represents a true difference greater than zero.

The difference between the average scores of story XIa and story XIb is zero.

The significance of the difference is .410.

The difference divided by the reliability of the difference is zero. There are 50 chances in 100 that the obtained difference represents a true difference greater than zero. There are an equal number of chances that it represents a true difference less than zero.

Story XIa ranks first, according to average scores.

Stories XIb and XIc rank the same. There is a fifty-fifty chance that either would rank second or third.

The difference between the average scores of story XIIa and story XIIc is .435.

The reliability of the difference is .379.

The significance of the difference is 1.14 or 86 chances in 100.

The difference between the average scores of stories XIIa and XIIb is .810.

The reliability of the

17. Garrett, Henry E., Statistics in Psychology and Education, p. 134.

Table XV

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF XII STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
XIIa	13,045	3.893	.275
XIIb	12.235	3.144	.222
XIIc	12.610	3.714	.262

difference is .353.

The significance of the difference is 2.2 or 99 chances in 100.

The difference between the average scores of stories XIIc and XIIb is .375.

The reliability of the difference is .343.

The significance of the difference is 1.09 or 85 chances in 100.

The ranking of these three stories according to their average scores is as follows: XIIa first, XIIc second, XIIb third.

Table XVI

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF XIII STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
XIIIa	11.860	4.728	.334
XIIIb	12.895	4.083	.288
XIIIc	12.850	3.966	.280

The difference between the average comprehension scores of story XIIIb and story XIIIc is .045.

The reliability of the difference is .401.

The significance of the difference is .11. There are, then, 54 chances in 100 that the true difference between the two obtained measures is greater than zero.

The difference in the average scores of story XIIIb and XIIIa is 1.035.

The reliability of the difference is .441.

The significance of the difference is 2.3 or 99 chances in 100.

The difference in the average scores of story XIIIc and story XIIIa is .990.

The reliability of the difference is .435.

The significance of the difference is 2.2 or 99 chances in 100.

The ranking of these stories according to their average comprehension score is as follows: first, XIIIb; second, XIIIc; third, XIIIa. The rank of story XIIIb is an uncertain one, as there are 46 chances in 100 that story XIIIc would rank first.

Table XVII

A SUMMARY OF THE RANKING OF THE ANIMAL STORIES ACCORDING TO AVERAGE COMPREHENSION SCORE WHEN THE FORM OF STORY IS CONSTANT

First rank	XIc	XIIa	XIIIb[1]
Second rank	XIa-XIb	XIIc	XIIIc
Third rank	" "	XIIb	XIIIa

1. 46 chances in 100 that XIIIb ranks higher than XIIIc

Table XVII presents a summary of the ranking of the animal stories according to their average comprehension scores when the form of the story is constant and the kind of sentence varies. It may be seen that there is no definite evidence that either of the three forms of sentence consistently ranks highest or lowest.

The difference between the average comprehension scores of story XIIa and story XIa is .165.

The reliability of the difference is .423.

The significance of the

Table XVIII

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF Xa STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
XIa	12.880	4.557	.322
XIIa	13.045	3.893	.275
XIIIa	11.860	4.728	.334

difference is .39 or 64 chances in 100.

The difference between the average comprehension scores of story XIIa and story XIIIa is 1.185.

The reliability of the difference is .432.

The significance of the difference is 2.7 or 100 chances in 100.

The difference between the average comprehension scores of story XIa and story XIIIa is 1.020.

The reliability of the difference is .463.

The significance of the difference is 2.2 or 99 chances in 100.

In this group, story XIIa ranks first; story XIa ranks second (with 36 chances in 100 of ranking first); story XIIIa ranks third.

Table XIX

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF Xb STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Relibility of mean
XIb	12.880	3.609	.255
XIIb	12.235	3.144	.222
XIIIb	12.895	4.083	.288

The difference between the average comprehension scores of story XIIIb and story XIb is .015.

The reliability of the difference is .384.

The significance of the difference is .039 or 51 chances in 100 that the true difference is greater than zero. (There are, also, 49 chances in 100 that the obtained difference represents a true difference less than zero.)

The difference between the average comprehension scores of story XIIIb and story XIIb is .660.

The reliability of the difference is .363.

The significance of the difference is 1.8 or 96 chances in 100.

The difference between the average comprehension scores of stories XIb and XIIb is .645.

The reliability of the difference is .338.

The significance of the difference is 1.9 or 97 chances in 100.

The ranking in this group of stories is as follows: story XIIIb first (with 49 chances in 100 of ranking second), story XIb second (with 49 chances in 100 of ranking first), story XIIb third.

Table XX

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF Xc STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
XIc	13.255	4.089	.289
XIIc	12.610	3.714	.262
XIIIc	12.850	3.966	.280

The difference between the average comprehension scores of story XIc and that of XIIc is .405.

The reliability of the difference is .402.

The significance of the difference is 1.00 or 84 chances in 100.

The difference between the average comprehension scores of stories XIc and XIIc is .654.

The reliability of the difference is .390.

The significance of the difference is 1.6 or 94 chances in 100.

The difference between the average comprehension scores of story XIIIc and story XIIc is .240.

The reliability of the difference is .383.

The significance of the difference is .62 or 73 chances in 100.

Story XIc ranks first in this group; story XIIIc ranks second; story XIIc ranks third.

Table XXI

A SUMMARY OF THE RANKING OF THE ANIMAL STORIES ACCORDING TO AVERAGE COMPREHENSION SCORES WHEN THE KIND OF SENTENCE IS CONSTANT

First rank	XIIa[1]	XIIIb[2]	XIc
Second rank	XIa	XIb	XIIIc
Third rank	XIIIa	XIIb	XIIc

1. 36 chances in 100 of ranking second.
2. 49 chances in 100 of ranking second.

While there is little agreement in the ranking of these stories as is seen in Table XXI, there is a slight indication of agreement in that in 36 chances out of 100 XIa would rank first, and in 49 cases out of 100 XIb would rank first. In those cases the form of story containing direct conversation would rank first in each group. The story containing indirect conversation ranks lowest in two out of three groups.

Table XXII

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF YI STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
YIa	14.185	3.636	.257
YIb	13.870	3.894	.275
YIc	13.495	3.987	.281

The difference between the average comprehension scores of story YIa and story YIb is .315.

The reliability of the difference is .376.

The significance of the difference is .837 or 79 chances in 100.

The difference between the average comprehension scores of story YIa and story YIc is .690.

The reliability of the difference is .380.

The significance of the difference is 1.8 or 96 chances in 100.

The difference between the average comprehension scores of story YIb and story YIc is .375.

The reliability of the difference is .393.

The significance of the difference is .95 or 83 chances in 100.

The ranking of the stories in this group according to highest average comprehension score is as follows: Story YIa first, story YIb second, story YIc third.

Table XXIII

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF YII STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
YIIa	12.415	4.485	.317
YIIb	12.535	4.428	.313
YIIc	13.210	3.927	.277

The difference between the average comprehension scores of stories YIIc and YIIb is .675.

The reliability of the difference is .417.

The significance of the difference is 1.61 or 94 chances in 100.

The difference in the average comprehension scores of story YIIc and YIIa is .795.

The reliability of the difference is .421.

The significance of the difference is 1.88 or 96 chances in 100.

The difference in the average comprehension scores of story YIIb and story YIIa is .120.

The reliability of the difference is .445.

The significance of the difference is .26 or 60 chances in 100.

The ranking of this group is: Story YIIc first, story YIIb second, story YIIa third (with 40 chances in 100 to rank second).

Table XXIV

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF YIII STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
YIIIa	13.585	3.825	.270
YIIIb	12.850	4.311	.304
YIIIc	13.270	3.612	.255

The difference in the average comprehension scores of story YIIIa and story YIIIc is .315.

The reliability of the difference is .371.

The significance of the difference is .85 or 80 chances in 100.

The difference in the average comprehension scores of stories YIIIa and YIIIb is .735.

The reliability of the difference is .406.

The significance of the difference is 1.8 or 96 chances in 100.

The difference in the average comprehension scores of stories YIIIc and YIIIb is .420.

The reliability of the difference is .396.

The significance of the difference is 1.06 or 85 chances in 100.

The ranking in this group is as follows: first, YIIIa; second, YIIIc; third YIIIb.

Table XXV

A SUMMARY OF THE RANKING OF THE CHILD ACTIVITY STORIES ACCORDING TO AVERAGE COMPREHENSION SCORES WHEN THE FORM OF STORY IS CONSTANT

First rank	YIa	YIIc	YIIIa
Second rank	YIb	YIIb	YIIIc
Third rank	YIc	YIIa[1]	YIIIb

1. 40 chances in 100 to rank second.

Table XXV shows that among the child activity stories a story with mixed sentences ranks highest twice. There is no agreement in the lowest rank except for the fact that in 40 chances out of 100 YIIb would rank third, in which cases a story with short simple sentences would rank lowest in two groups.

Table XXVI

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF Ya STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
YIa	14.185	3.636	.257
YIIa	12.415	4.485	.317
YIIIa	13.585	3.825	.270

The difference between the average comprehension scores of stories YIa and YIIIa is .600.

The reliability of the difference is .272.

The significance of the difference is 2.2 or 99 chances in 100.

The difference between the average comprehension scores of stories YIa and YIIa is 1.770.

The reliability of the difference is .408.

The significance of the difference is 4.3, which indicates with certainty that the obtained difference represents a true difference greater than zero.

The difference between the average comprehension scores of stories YIIIa and YIIa is 1.170.

The reliability of the difference is .416.

The significance of the difference is 2.8 or 100 chances in 100.

Story YIa ranks first; story YIIIa ranks second; story YIIa ranks third in this group.

Table XXVII

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF Yb STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
YIb	13.870	3.894	.275
YIIb	12.535	4.428	.313
YIIIb	12.850	4.311	.304

The difference between the average comprehension scores of stories YIb and YIIIb is 1.02.

The reliability of the difference is .409.

The significance of the difference is 2.4 or 99 chances in 100.

The difference between the average comprehension scores of stories YIb and YIIb is 1.335.

The reliability of the difference is .416.

The significance of the difference is 3.2, which indicates with certainty that the obtained difference represents a true difference greater than zero.

The difference between the average comprehension scores of stories YIIIb and YIIb is .315.

The reliability of the difference is .436.

The significance of the difference is .72 or 76 chances in 100.

Story YIb ranks first; story YIIb ranks second; story YIIb ranks third in this group.

Table XXVIII

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF Yc STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
YIc	13.495	3.987	.281
YIIc	13.210	3.927	.277
YIIIc	13.270	3.612	.255

The difference between the average comprehension scores of story YIc and story YIIIc is .225.

The reliability of the difference is .379.

The significance of the difference is .59 or 72 chances in 100.

The difference between the average comprehension scores of story YIc and story YIIc is .285.

The reliability of the difference is .394.

The significance of the difference is .72 or 76 chances in 100.

The difference between the average comprehension scores of stories YIIIc and YIIc is .06.

The reliability of the difference is .376.

The significance of the difference is .16 or 56 chances in 100.

The ranking of the stories in this group according to highest average score is as follows: first, story YIc; second, story YIIIc; third, YIIc (with 44 chances in 100 to rank second).

Table XXIX

A SUMMARY OF THE RANKING OF THE CHILD ACTIVITY STORIES ACCORDING TO AVERAGE COMPREHENSION SCORE WHEN THE KIND OF SENTENCE IS CONSTANT

First rank	YIa	YIb	YIc
Second rank	YIIIa	YIIIb	YIIIc
Third rank	YIIa	YIIb	YIIc[1]

1. 44 chances in 100 to rank second.

In the child activity stories there appears to be a general agreement that the stories containing direct conversation rank highest in average comprehension score and those containing indirect conversation rank lowest.

Table XXX

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF ZI STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
ZIa	10.525	3.858	.272
ZIb	12.970	3.723	.263
ZIc	10.660	4.620	.326

The difference between the average comprehension scores of story ZIb and story ZIc is 2.310.

The reliability of the difference is .418.

The significance of the difference is 5.5, which gives assurance that the obtained difference represents a true difference greater than zero.

The difference between the average comprehension scores of story ZIb and story ZIa is 2.445.

The reliability of the difference is .378.

The significance of the difference is 6.4, which indicates complete reliability. The obtained difference represents a true difference greater than zero.

The difference in the average comprehension scores of story ZIc and ZIa is .135.

The reliability of the difference is .424.

The significance of the difference is .31 or 62 chances in 100.

The ranking in this group is: first, story ZIb; second, story ZIc; third, story ZIa (with 38 chances in 100 of ranking second).

Table XXXI

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF ZII STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
ZIIa	12.145	4.062	.287
ZIIb	11.815	3.852	.272
ZIIc	11.695	4.473	.316

The difference between the average comprehension scores of story ZIIa and story ZIIb is .330.

The reliability of the difference is .395.

The significance of the difference is .83 or 79 chances in 100.

The difference between the average comprehension scores of stories ZIIa and ZIIc is .450.

The reliability of the difference is .426.

The significance of the difference is 1.05 or 85 chances in 100.

The difference of the average comprehension scores of stories ZIIb and ZIIc is .120.

The reliability of the difference is .416.

The significance of the difference is .28 or 61 chances in 100.

The ranking of this group is as follows: first, ZIIa; second, ZIIb; third, ZIIc (with 39 chances in 100 to rank second).

Table XXXII

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF ZIII STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
ZIIIa	10.840	4.569	.323
ZIIIb	11.275	3.893	.275
ZIIIc	11.545	3.804	.268

The difference in the average comprehension scores of stories ZIIIc and ZIIIb is .270.

The reliability of the difference is .384.

The significance of the difference is .70 or 76 chances in 100.

The difference in the average comprehension scores of stories ZIIIc and ZIIIa is .705.

The reliability of the difference is .419.

The significance of the difference is 1.68 or 95 chances in 100.

The difference in the average comprehension scores of stories ZIIIb and ZIIIa is .435.

The reliability of the difference is .424.

The significance of the difference is 1.02 or 84 chances in 100.

The ranking in this group is: first, ZIIIc; second, ZIIIb; third, ZIIIa.

Table XXXIII

A SUMMARY OF THE RANKING OF THE INDIAN STORIES ACCORDING TO AVERAGE COMPREHENSION SCORES WHEN THE FORM OF STORY IS CONSTANT

First rank	ZIb	ZIIa	ZIIIc
Second rank	ZIc	ZIIb	ZIIIb
Third rank	ZIa[1]	ZIIc	ZIIIa

1. 38 chances in 100 to rank second.

In the Indian stories there is no agreement as to the highest rank and only a slight indication that stories with mixed sentences rank lowest. In this instance, however, there are only two out of three stories ranking lowest and there are 38 chances in 100 that ZIa would rank second. In this case, there would be two out of three cases in which stories with long complex and compound sentences ranked lowest.

The difference between the average comprehension scores of story ZIIa and story ZIIIa is 1.305.

The reliability of the difference is .432.

Table XXXIV

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF Za STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
ZIa	10.525	3.858	.272
ZIIa	12.145	4.062	.287
ZIIIa	10.840	4.569	.323

The significance of the difference is 3.0 or 100 chances in 100.

The difference between the average comprehension scores of story ZIIa and story ZIa is 1.620.

The reliability of the difference is .395.

The significance of the difference is 4.1 which indicates that the obtained difference represents a true difference greater than zero.

The difference between the average comprehension scores of story ZIIIa and ZIa is .315.

The reliability of the difference is .422.

The significance of the difference is .74 or 76 chances in 100.

The ranking of the stories in this group according to highest average comprehension score is: first, ZIIa; second, ZIIIa; third, ZIa.

Table XXXV

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF Zb STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
ZIb	12.970	3.723	.263
ZIIb	11.815	3.852	.272
ZIIIb	11.275	3.893	.275

The difference between the average comprehension scores of stories ZIb

and ZIIb is 1.155.

The reliability of the difference is .378.

The significance of the difference is 3.05 or 100 chances in 100.

The difference between the average comprehension scores of stories ZIb and ZIIIb is 1.695.

The reliability of the difference is .380.

The significance of the difference is 4.4 or certainty that the obtained difference represents a true difference greater than zero.

The difference between the average comprehension scores in stories ZIIb and ZIIIb is .540.

The reliability of the difference is .386.

The significance of the difference is 1.4 or 92 chances in 100.

The ranking of the stories in this group is: story ZIb first, story ZIIb second, and story ZIIIb third.

Table XXXVI

A COMPARISON OF AVERAGE COMPREHENSION SCORES OF Zc STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
ZIc	10.660	4.620	.326
ZIIc	11.695	4.473	.316
ZIIIc	11.545	3.804	.268

The difference between the average comprehension scores of stories ZIIc and ZIIIc is .150.

The reliability of the difference is .414.

The significance of the difference is .36 or 64 chances in 100.

The difference between the average comprehension scores of story ZIIc and story ZIc is 1.035.

The reliability of the difference is .454.

The significance of the difference is 2.2 or 99 chances in 100.

The difference between the average comprehension scores of stories ZIIIc and ZIc is .885.

The reliability of the difference is .422.

The significance of the difference is 2.1 or 98 chances in 100.

Story ZIIc ranks first (with 36 chances in 100 to rank second); story ZIIIc ranks second; story ZIc ranks third in this group.

Table XXXVII

A SUMMARY OF THE RANKING OF THE INDIAN STORIES ACCORDING TO AVERAGE COMPREHENSION SCORE WHEN THE KIND OF SENTENCE IS CONSTANT

First rank	ZIIa	ZIb	ZIIc[1]
Second rank	ZIIIa	ZIIb	ZIIIc
Third rank	ZIa	ZIIIb	ZIc

1. 36 chances in 100 to rank second.

There is only slight evidence from Table XXXVII that any one of the Indian stories ranks highest in average comprehension score when the kind of sentence is constant. Stories with indirect conversation rank highest in two out of three cases, but in one instance the chances are only 64 in 100 for this ranking. A story with direct conversation ranks lowest in two out of three cases.

According to the data presented in Table XXXVIII a story with a mixture of long and short, simple, complex and compound sentences ranks highest four times. In each case the number of chances for ranking is 79 or more in 100.

A story with short simple sentences ranks highest twice. In one case the ranking is definite with 100 chances in 100, in the other the number of chances in 100 is only 54.

A story with long complex and compound sentences ranks highest three times. In one case there are 76 chances in 100, in another 80 chances in 100, and in the third 94 chances in 100.

Table XXXVIII

A SUMMARY OF THE HIGHEST AND LOWEST RANKING OF ALL STORIES ACCORDING TO AVERAGE COMPREHENSION SCORE WHEN THE FORM OF STORY IS CONSTANT

	Animal story (X)		Child activity story (Y)		Indian story (Z)	
Rank	Story	Number chances in 100 for ranking	Story	Number chances in 100 for ranking	Story	Number chances in 100 for ranking
Highest	Ic	80	Ia	79	Ib	100+
Lowest	Ia-Ib	50	Ic	83	Ia	62
Highest	IIa	86	IIc	94	IIa	79
Lowest	IIb	85	IIa	60	IIc	61
Highest	IIIb	54	IIIa	80	IIIc	76
Lowest	IIIa	99	IIIb	85	IIIa	84

A story with mixed sentences ranks lowest five times. In one instance there are only 50 chances, in another 54 chances in 100 for this ranking.

A story with short simple sentences ranks lowest three times. In one case this ranking depends upon 50 chances in 100.

A story with long complex and compound sentences ranks lowest two times with 61 and 83 chances in 100 for the ranking.

From these data it does not appear that either the highest or lowest average comprehension scores have been produced by stories written in any one type of sentence. Rather, the kind of sentence seems to have no influence on the reading comprehension of fourth-grade pupils.

According to Table XXXIX a story containing direct conversation ranks first five times. In one instance the ranking given depends upon 72 chances in 100; in another upon 84 chances in 100; in the others, 99 in 100, and 100 chances in 100.

A story containing indirect conversation ranks highest three times with the ranking given depending upon 64 chances in 100 in two cases, and 100 chances in 100 in the other.

A story written in play form ranks first once with only 51 chances in 100 for its ranking.

A story written in direct conversation ranks lowest twice, with 76 chances in 100 in one instance; and 98 chances in 100 in the other for the ranking.

A story containing indirect conversation ranks lowest five times. The numbers of chances in 100 for this ranking are one hundred, ninety-seven, seventy-six, seventy-three and fifty-six respectively.

A story written in play form ranks lowest twice, with 99 and 92 chances in 100 for the ranking.

From these data, it appears that no one form of story consistently receives either the highest or the lowest ranking.

In considering all twenty-seven stories, however, there is some indication that stories containing direct conversation produce the highest average comprehension score; and that stories containing indirect conversation

Table XXXIX

A SUMMARY OF THE HIGHEST AND LOWEST RANKING OF ALL STORIES ACCORDING TO AVERAGE COMPREHENSION SCORE WHEN THE KIND OF SENTENCE IS CONSTANT

	Animal story (X)		Child activity story (Y)		Indian story (Z)	
Rank	Story	Number chances in 100 for ranking	Story	Number chances in 100 for ranking	Story	Number chances in 100 for ranking
Highest	IIa	64	Ia	99	IIa	100
Lowest	IIIa	99	IIa	100	Ia	76
Highest	IIIb	51	Ib	99	Ib	100
Lowest	IIb	97	IIb	76	IIIb	92
Highest	Ic	84	Ic	72	IIc	64
Lowest	IIc	73	IIc	56	Ic	98

produce the lowest average comprehension scores.

3. Interpretation of the Rate Scores for the Twenty-seven Stories

At the time of presenting the stories, when pupils had been reading each story for a period of two minutes they were asked to make a large check mark above the word they were reading when the examiner said, "check." Later the words in each story up to this check mark were counted and the number divided by two. The result was recorded as the pupils' rate of reading per minute for that story. The two hundred scores were arranged in frequency tables and were submitted to the same statistical procedure as the scores obtained from the tests for comprehension. That is, the arithmetic mean (average), the standard deviation, and the reliability of the mean were determined for the rate scores of each story. The data for each group of three stories, with either the form of story or kind of sentence constant were compared and the highest ranking story in terms of average rate score determined. In order to rank the stories as accurately as possible, the reliability of the difference was found by the use of the formula

$$\sigma(\text{diff.}) = \sqrt{\sigma(\text{av.}^1) + \sigma(\text{av.}^2)}.$$

The significance of the difference was determined by dividing the obtained difference of two average rate scores by the reliability of the difference. By reference to a table,[18] the number of chances in 100 that the obtained difference represented a true difference greater than zero was determined. The truth of these facts was, of course, based upon the assumption that these were representative samplings of the rate of fourth-grade pupils and that the two hundred scores formed a normal frequency distribution.

To present and interpret these data is the purpose of this section.

The difference between the average rate scores of story XIc and XIa is 21.500.

The reliability of the difference is 7.907.

18. Garrett, Henry E., Statistics in Psychology and Education, p. 134.

Table XL

A COMPARISON OF AVERAGE RATE SCORES OF XI STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
XIa	163.750	74.450	5.264
XIb	156.750	56.650	4.005
XIc	185.250	83.450	5.901

The significance of the difference is 2.71 or 100 chances in 100 that the true difference is greater than zero.

The difference between the average rate scores of story XIc and story XIb is 28.500.

The reliability of the difference is 7.131.

The significance of the difference is 3.99 or certainty that the obtained difference represents a true difference greater than zero.

The difference between the average rate scores of story XIa and story XIb is 7.000.

The reliability of the difference is 6.614.

The significance of the difference is 1.05 or 85 chances in 100.

The ranking for this group is as follows: first, XIc; second, XIa; third, XIb.

Table XLI

A COMPARISON OF AVERAGE RATE SCORES OF XII STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
XIIa	201.750	96.150	6.798
XIIb	159.250	65.950	4.663
XIIc	175.750	73.750	5.214

The difference between the average rate scores of stories XIIa and XIIc is 26.000.

The reliability of the difference is 8.567.

The significance of the difference is 3.03 or 100 chances in 100.

The difference between the average rate scores of stories XIIa and XIIb is 42.500.

The reliability of the difference is 8.243.

The significance of the difference is 5.15, which indicates with certainty that the obtained difference represents a true difference greater than zero.

The difference between the average rate scores of stories XIIc and XIIb is 16.500.

The reliability of the difference is 6.994.

The significance of the difference is 2.35 or 99 chances in 100.

The ranking for this group places story XIIa first, XIIc second, and XIIb third.

Table XLII

A COMPARISON OF AVERAGE RATE SCORES OF XIII STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
XIIIa	172.750	57.900	4.094
XIIIb	189.500	73.350	5.186
XIIIc	189.750	73.550	5.201

The difference between the average rate scores of stories XIIIc and XIIIb is .250.

The reliability of the difference is 7.276.

The significance of the difference is .034 or 50 chances in 100.

The difference between the average rate scores of stories XIIIc and XIIIa is 17.000.

The reliability of the difference is 6.619.

The significance of the difference is 2.56 or 99 chances in 100.

The difference between the average rate scores of stories XIIIb and XIIIa is 16.750.

The reliability of the difference is 6.531.

The significance of the difference is 2.56 or 99 chances in 100.

The ranking of this group is: story XIIIc first (with 50 chances in 100 of ranking second), story XIIIb second (with 50 chances in 100 of ranking first), story XIIIa third.

Table XLIII

A SUMMARY OF THE RANKING OF THE ANIMAL STORIES ACCORDING TO AVERAGE RATE SCORES WHEN THE FORM OF STORY IS CONSTANT

First rank	XIc	XIIa	XIIIc[1]
Second rank	XIa	XIIc	XIIIb[2]
Third rank	XIb	XIIb	XIIIa

1. 50 chances in 100 to rank second.
2. 50 chances in 100 to rank first.

In the animal story, as is seen from Table XLII, there is no agreement in the first rank, except for 50 chances in 100 that story XIIIc ranks first, which would place two out of three stories with long complex and compound sentences in first rank. A story containing short simple sentences ranks lowest in two out of three stories.

Table XLIV

A COMPARISON OF AVERAGE RATE SCORES OF Xa STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
XIa	163.750	74.450	5.264
XIIa	201.750	96.150	6.798
XIIIa	172.750	57.900	4.094

The difference in the average rate scores of story XIIa and story XIIIa is 29.000.

The reliability of the difference is 7.935.

The significance of the difference is 3.65 or more than 100 chances in 100.

The difference in the average rate scores of story XIIa and XIa is 38.000.

The reliability of the difference is 8.597.

The significance of the difference is 4.42, which signifies that the obtained difference represents a true difference greater than zero.

The difference in the average rate scores of story XIIIa and XIa is 9.000.

The reliability of the difference is 6.668.

The significance of the difference is 1.35 or 91 chances in 100.

The stories in this group rank as follows: first, story XIIa; second, story XIIIa; third, story XIa.

Table XLV

A COMPARISON OF AVERAGE RATE SCORES OF Xb STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
XIb	156.750	56.650	4.005
XIIb	159.250	65.950	4.663
XIIIb	189.500	73.350	5.186

The difference in the average rate scores of stories XIIIb and XIIb is 30.250.

The reliability of the difference is 6.902.

The significance of the difference is 4.38, which indicates with certainty that the obtained difference represents a true difference greater than zero.

The difference in the average

rate scores of stories XIIIb and XIb is 32.750.

The reliability of the difference is 6.475.

The significance of the difference is 5.05 or certainty that the obtained difference represents a true difference greater than zero.

The difference in the average rate scores of stories XIIb and XIb is 2.500.

The reliability of the difference is 6.146.

The significance of the difference is .406 or 65 chances in 100.

The ranking is as follows: first, story XIIIb; second, story XIIb; third, story XIb (with 35 chances in 100 of ranking second).

Table XLVI

A COMPARISON OF AVERAGE RATE SCORES OF Xc STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
XIc	185.250	83.450	5.901
XIIc	175.750	73.750	5.214
XIIIc	189.750	73.550	5.201

The difference between the average rate scores of stories XIIIc and XIc is 4.500.

The reliability of the difference is 7.865.

The significance of the difference is .572 or 71 chances in 100.

The difference between the average rate scores of stories XIIIc and XIIc is 14.000.

The reliability of the difference is 7.364.

The significance of the difference is 1.9 or 97 chances in 100.

The difference between the average rate scores of stories XIc and XIIc is 9.500.

The reliability of the difference is 7.874.

The significance of the difference is 1.2 or 88 chances in 100.

The ranking for this group is as follows: first, story XIIIc; second, XIc; third, XIIc.

Table XLVII

A SUMMARY OF THE RANKING OF THE ANIMAL STORIES ACCORDING TO AVERAGE RATE SCORES WHEN THE KIND OF SENTENCE IS CONSTANT

First rank	XIIa	XIIIb	XIIIc
Second rank	XIIIa	XIIb	XIc
Third rank	XIa	XIb[1]	XIIc

1. 35 chances in 100 to rank second.

Table XLVII shows that for the animal story group, a story written in play form ranks first in two out of three groups. A story containing direct conversation ranks lowest in two out of three, while there is almost an equal chance of a story containing indirect conversation ranking lowest in two out of three cases.

Table XLVIII

A COMPARISON OF AVERAGE RATE SCORES OF YI STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
YIa	179.500	67.500	4.773
YIb	178.500	61.500	4.324
YIc	206.750	93.600	6.618

The difference between the average rate scores of stories YIc and YIa is 27.250.

The reliability of the difference is 8.159.

The significance of the difference is 3.33 or more than 100 chances in 100.

The difference between the average rate scores of stories YIc and YIb is 28.250.

The reliability of the difference is 7.905.

The significance of the difference is 3.57 or more than 100 chances in 100.

The difference between the average rate scores of stories YIa and YIb is 1.000.

The reliability of the difference is 5.610.

The significance of the difference is .178 or 57 chances in 100.

The ranking for this group is: story YIc first, story YIa second, and story YIb third (with 43 chances in 100 to rank second).

Table XLIX

A COMPARISON OF AVERAGE RATE SCORES OF YII STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
YIIa	156.250	72.050	5.094
YIIb	156.500	63.550	4.493
YIIc	173.500	70.150	4.960

The difference between the average rate scores of stories YIIc and YIIb is 17.000.

The reliability of the difference is 6.692.

The significance of the difference is 2.54 or 99 chances in 100.

The difference between the average rate scores of stories YIIc and YIIa is 17.250.

The reliability of the difference is 7.109.

The significance of the difference is 2.42 or 99 chances in 100.

The difference between the average rate scores of stories YIIb and YIIa is .250.

The reliability of the difference is 6.792.

The significance of the difference is .036 or 50 chances in 100.

Story YIIc ranks first in this group; story YIIb ranks second (with 50 chances in 100 of ranking third); story YIIa ranks third (with 50 chances in 100 of ranking second).

Table L

A COMPARISON OF AVERAGE RATE SCORES OF YIII STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
YIIIa	177.000	67.400	4.765
YIIIb	176.250	71.150	5.031
YIIIc	193.500	79.500	5.621

The difference between the average rate scores of stories YIIIc and YIIIa is 16.500.

The reliability of the difference is 7.362.

The significance of the difference is 2.24 or 99 chances in 100.

The difference between the average rate scores of stories YIIIc and YIIIb is 17.250.

The reliability of the difference is 7.543.

The significance of the difference is 2.28 or 99 chances in 100.

The difference between the average rate scores of stories YIIIa and YIIIb is .750.

The reliability of the difference is 6.922.

The significance of the difference is .108 or 54 chances in 100.

The rank of this group is as follows: story YIIIc first, story YIIIa second, story YIIIb third (with 46 chances in 100 to rank second).

Table LI

A SUMMARY OF THE RANKING OF THE CHILD ACTIVITY STORIES ACCORDING TO AVERAGE RATE SCORE WHEN THE FORM OF STORY IS CONSTANT

First rank	YIc	YIIc	YIIIc
Second rank	YIa[1]	YIIb[2]	YIIIa
Third rank	YIb	YIIa[3]	YIIIb[4]

1. 43 chances in 100 to rank second.
2. 50 chances in 100 to rank third.
3. 50 chances in 100 to rank second.
4. 46 chances in 100 to rank second.

Among the child activity stories, a story written in long complex and compound sentences ranks highest in each group. A sentence containing short simple sentences ranks lowest in two out of three groups. Since the third ranking for each group is uncertain, there is almost an equal chance that stories with mixed sentences may rank lowest.

Table LII

A COMPARISON OF AVERAGE RATE SCORES OF Ya STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
YIa	179.500	67.500	4.773
YIIa	156.250	72.050	5.094
YIIIa	177.000	67.400	4.765

The difference between the average rate scores of story YIa and story YIIIa is 2.500.

The reliability of the difference is 6.736.

The significance of the difference is .371 or 64 chances in 100.

The difference between the average rate scores of story YIa and story YIIa is 23.250.

The reliability of the difference is 6.980.

The significance of the difference is 3.3 or more than 100 chances in 100.

The difference between the average rate scores of story YIIIa and story YIIa is 20.750.

The reliability of the difference is 6.968.

The significance of the difference is 2.97 or 100 chances in 100.

The ranking for this group is: first, story YIa (with 36 chances in 100 to rank second); second, story YIIIa; third, story YIIa.

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Table LIII

A COMPARISON OF AVERAGE RATE SCORES OF Yb STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
YIb	178.500	61.150	4.324
YIIb	156.500	63.550	4.493
YIIIb	176.250	71.150	5.031

The difference between the average rate scores of stories YIb and YIIIb is 2.250.

The reliability of the difference is 6.633.

The significance of the difference is .339 or 62 chances in 100.

The difference between the average rate scores of story YIb and YIIb is 22.000.

The reliability of the difference is 6.235.

The significance of the difference is 3.52 or more than 100 chances in 100.

The difference between the average rate scores of story YIIIb and story YIIb is 19.750.

The reliability of the difference is 6.745.

The significance of the difference is 2.92 or 100 chances in 100.

The ranking for this group is: first, story YIb (with 38 chances in 100 to rank second); second, YIIIb; third, YIIb.

Table LIV

A COMPARISON OF AVERAGE RATE SCORES OF Yc STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
YIc	206.750	93.600	6.618
YIIc	173.500	70.150	4.960
YIIIc	193.500	79.500	5.621

The difference between the average rate scores of stories YIc and YIIIc is 13.250.

The reliability of the difference is 8.682.

The significance of the difference is 1.52 or 93 chances in 100.

The difference between the average rate scores of stories YIc and YIIc is 33.250.

The reliability of the difference is 8.270.

The significance of the difference is 4.02, a certainty that the true difference is greater than zero.

The difference between the average rate scores of stories YIIIc and YIIc is 20.000.

The reliability of the difference is 7.496.

The significance of the difference is 2.66 or 99 chances in 100.

The ranking in this group is: first, story YIc; second, story YIIIc; third, story YIIc.

Table LV

A SUMMARY OF THE RANKING OF THE CHILD ACTIVITY STORIES ACCORDING TO AVERAGE RATE SCORES WHEN THE KIND OF SENTENCE IS CONSTANT

First rank	YIa[1]	YIb[2]	YIc
Second rank	YIIIa	YIIIb	YIIIc
Third rank	YIIa	YIIb	YIIc

1. 36 chances in 100 to rank second.
2. 58 chances in 100 to rank second.

According to Table LV, in the child activity stories, those containing direct conversation rank highest in average rate score, except for YIa which has 36 chances in 100 to rank second and YIb which has 42 chances in 100 to rank first. In each of these instances a story written in play form would rank first. Stories containing indirect conversation rank lowest in all three groups.

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Table LVI

A COMPARISON OF AVERAGE RATE SCORES OF ZI STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
ZIa	182.250	97.650	6.904
ZIb	167.250	62.000	4.384
ZIc	190.000	98.050	6.933

The difference between the average rate scores for stories ZIc and ZIa is 7.750.

The reliability of the difference is 9.784.

The significance of the difference is .79 or 78 chances in 100.

The difference between the average rate scores for stories ZIc and ZIb is 22.750.

The reliability of the difference is 8.202.

The significance of the difference is 2.77 or 100 chances in 100.

The difference between the average rate scores for stories ZIa and ZIb is 15.000.

The reliability of the difference is 8.178.

The significance of the difference is 1.83 or 96 chances in 100.

The ranking for this group is as follows: story ZIc first, story ZIa second, and story ZIb third.

Table LVII

A COMPARISON OF AVERAGE RATE SCORES FOR ZII STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
ZIIa	179.500	62.100	4.391
ZIIb	167.000	71.600	5.062
ZIIc	176.000	78.900	5.579

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The difference between the average rate scores for story ZIIa and story ZIIc is 3.500.

The reliability of the difference is 7.099.

The significance of the difference is .49 or 68 chances in 100.

The difference between the average rate scores for story ZIIa and story ZIIb is 12.500.

The reliability of the difference is 6.701.

The significance of the difference is 1.86 or 96 chances in 100.

The difference between the average rate scores for story ZIIc and story ZIIb is 9.000.

The reliability of the difference is 7.533.

The significance of the difference is 1.19 or 88 chances in 100.

The ranking in the group is as follows: story ZIIa first, story ZIIc second, and story ZIIb third.

Table LVIII

A COMPARISON OF AVERAGE RATE SCORES OF ZIII STORIES WHEN THE KIND OF SENTENCE VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
ZIIIa	157.500	68.000	4.808
ZIIIb	178.500	77.400	5.473
ZIIIc	186.250	79.650	5.632

The difference between the average rate scores for stories ZIIIc and ZIIIb is 7.750.

The reliability of the difference is 7.853.

The significance of the difference is .98 or 84 chances in 100.

The difference between the average rate scores for stories ZIIIc and ZIIIa is 28.750.

The reliability of the difference is 7.405.

The significance of the difference is 3.88 which indicates more than 100 chances in 100.

The difference between the average rate scores for stories ZIIIb and ZIIIa is 21.000.

The reliability of the difference is 7.284.

The significance of the difference is 2.88 or 100 chances in 100.

Story ZIIIc ranks first in this group; story ZIIIb ranks second; story ZIIIa ranks third.

Table LIX

A SUMMARY OF THE RANKING OF THE INDIAN STORIES ACCORDING TO AVERAGE RATE SCORE WHEN THE FORM OF STORY IS CONSTANT

First rank	ZIc	ZIIa	ZIIIc
Second rank	ZIa	ZIIc	ZIIIb
Third rank	ZIb	ZIIb	ZIIIa

Table LIX shows that in the Indian stories, a story written in long complex and compound sentences ranks highest in two out of three groups. Also, a story written in short simple sentences ranks lowest in two out of three groups.

Table LX

A COMPARISON OF AVERAGE RATE SCORES OF Za STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
ZIa	182.250	97.650	6.904
ZIIa	179.500	62.100	4.391
ZIIIa	157.500	68.000	4.808

The difference between the average rate scores for stories ZIa and ZIIa is 2.750.

The reliability of the difference is 8.182.

The significance of the difference is .336 or 63 chances in 100.

The difference between the average rate scores for stories ZIa and ZIIIa is 24.750.

The reliability of the difference is 8.413.

The significance of the difference is 2.94 or 100 chances in 100.

The difference between the average rate scores for stories ZIIa and ZIIIa is 22.000.

The reliability of the difference is 6.511.

The significance of the difference is 3.37 or more than 100 chances in 100.

Story ZIa ranks first in this group; story ZIIa ranks second; story ZIIIa ranks third.

Table LXI

A COMPARISON OF AVERAGE RATE SCORES OF Zb STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
ZIb	167.250	62.000	4.384
ZIIb	167.000	71.600	5.062
ZIIIb	178.500	77.400	5.473

The difference between the average rate scores for story ZIIIb and story ZIb is 11.250.

The reliability of the difference is 7.012.

The significance of the difference is 1.6 or 94 chances in 100.

The difference between the average rate scores for stories ZIIIb and ZIIb is 11.500.

The reliability of the difference is 7.455.

The significance of the difference is 1.54 or 93 chances in 100.

The difference between the average rate scores for story ZIb and story ZIIb is .250.

The reliability of the difference is 6.696.

The significance of the difference is .373 or 64 chances in 100.

The ranking for this group is as follows: first, story ZIIIb; second; story ZIb; third, story ZIIb.

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Table LXII

A COMPARISON OF AVERAGE RATE SCORES OF Zc STORIES WHEN THE FORM OF STORY VARIES

Story	Arithmetic mean	Standard deviation	Reliability of mean
ZIc	190.000	98.050	6.933
ZIIc	176.000	78.900	5.579
ZIIIc	186.250	79.650	5.632

The difference between the average rate scores for stories ZIc and ZIIIc is 3.750.

The reliability of the difference is 8.932.

The significance of the difference is .419 or 65 chances in 100.

The difference between the average rate scores for stories ZIc and ZIIc is 14.000.

The reliability of the difference is 8.898.

The significance of the difference is 1.57 or 93 chances in 100.

The difference between the average rate scores for story ZIIIc and story ZIIc is 10.250.

The reliability of the difference is 7.927.

The significance of the difference is 1.29 or 89 chances in 100.

The ranking for this group is: story ZIc first; story ZIIIc second, and story ZIIc third.

Table LXIII

A SUMMARY OF THE RANKING OF THE INDIAN STORIES ACCORDING TO AVERAGE RATE SCORES WHEN THE KIND OF SENTENCE IS CONSTANT

First rank	ZIa[1]	ZIIIb	ZIc[3]
Second rank	ZIIa	ZIb	ZIIIc
Third rank	ZIIIa	ZIIb[2]	ZIIc

1. 39 chances in 100 to rank second.
2. 36 chances in 100 to rank second.
3. 38 chances in 100 to rank second.

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Among the Indian stories, one containing direct conversation ranks highest in two out of three groups; but this ranking is uncertain as there are 39 chances in 100 for ZIa to rank second and 38 chances in 100 for ZIc to rank second. There would then be 38 chances in 100 for a story containing play form to rank highest. Table LXIII indicates that a story containing indirect conversation ranks lowest in two out of three groups. There are, however, 36 chances in 100 that ZIIb will rank second.

sentences ranks first only once, when ZIIIb stands a fifty-fifty chance with ZIIIc of ranking highest.

Taking all of these facts into consideration evidence points rather definitely to the conclusion that stories containing long complex and compound sentences rank highest in average rate score.

A story containing short simple sentences ranks lowest six times. Story XIb has 15 chances in 100 of ranking second when XIa would rank lowest. Story

Table LXIV

A SUMMARY OF THE HIGHEST AND LOWEST RANKING OF ALL STORIES ACCORDING TO AVERAGE RATE SCORE WHEN THE FORM OF STORY IS CONSTANT

	Animal story (X)		Child activity story (Y)		Indian story (Z)	
Rank	Story	Number chances in 100	Story	Number chances in 100	Story	Number chances in 100
Highest	Ic	100	Ic	100+	Ic	78
Lowest	Ib	85	Ib	57	Ib	96
Highest	IIa	100	IIc	99	IIa	68
Lowest	IIb	99	IIc	50	IIb	88
Highest	IIIc-IIIb	50-50	IIIc	99	IIIc	84
Lowest	IIIa	99	IIIb	54	IIIa	100

When all of the stories ranking highest according to average rate score, as shown in Table LXIV, are considered, one finds that a story containing long complex and compound sentences ranks highest seven times. Of these, four have a rather definite ranking. ZIc has 22 chances in 100 of ranking second, XIIIc has 50 chances in 100 of ranking second, ZIIIc has 16 chances in 100 of ranking second.

A story containing a mixture of long and short, simple, complex, and compound sentences ranks highest two times. Of these, there are 32 chances in 100 that ZIIa will rank second.

A story containing short simple

YIb has 43 chances in 100 of ranking second. In such case story YIa would rank third. Story ZIIb has 12 chances in 100 of ranking second when ZIIc would rank lowest. Story YIIIb has 46 chances in 100 of ranking second when YIIIa would rank lowest.

A story containing a mixture of long and short, simple, complex, and compound sentences ranks lowest three times. Two of these rankings are definite. Story YIIa has 50 chances in 100 of ranking second with an equal number of chances for YIIb to rank lowest.

A story written in long complex and compound sentences does not rank lowest in any group.

So it seems that judged by ranking of average rate scores, stories containing short simple sentences produce the lowest average rate scores by fourth-grade pupils.

inite ranking.

From the foregoing data, it appears that stories containing direct conversation or written in play form produce the highest average rate scores

Table LXV

A SUMMARY OF THE HIGHEST AND LOWEST RANKING OF ALL STORIES ACCORDING TO AVERAGE RATE SCORE WHEN THE KIND OF SENTENCE IS CONSTANT

	Animal story (X)		Child activity story (Y)		Indian story (Z)	
Rank	Story	Number chances in 100 for ranking	Story	Number chances in 100	Story	Number chances in 100 for ranking
Highest	IIa	100+	Ia	64	Ia	63
Lowest	Ia	91	IIa	100	IIIa	100+
Highest	IIIb	100+	Ib	62	IIIb	94
Lowest	Ib	65	IIb	100	IIb	64
Highest	IIIc	71	Ic	93	Ic	65
Lowest	IIc	88	IIc	99	IIc	89

One observes in Table LXV that a story containing direct conversation ranks highest five times. All of these rankings except one are rather indefinite. YIa has 36 chances in 100 to rank second giving highest rank to YIIIa. ZIa has 37 chances in 100 to rank second, when ZIIa would rank first. YIb has 38 chances in 100 to rank second, with YIIIb ranking first. ZIc has 35 chances in 100 to rank second with ZIIIc ranking highest.

A story written in play form ranks highest three times. Of these, story XIIIc has 28 chances in 100 to rank second. In this case story XIc would rank first. There are also thirty-six, forty-two, and thirty-five chances in 100 that YIIIa, YIIIb, and ZIIIa respectively would rank highest.

A story containing indirect conversation ranks highest once with a definite ranking.

for fourth-grade pupils.

The same table shows that a story containing indirect conversation ranks lowest six times with all of the rankings except one rather definitely established. There are 36 chances in 100 that ZIIb would rank second. In this case ZIb will rank lowest.

A story containing direct conversation ranks lowest two times. Story XIb has 35 chances in 100 of ranking second when XIIb would receive the lowest ranking.

A story written in play form ranks lowest only once with a definite ranking.

From these statements one would conclude that, judged on the basis of lowest average rate scores, stories containing indirect conversation produce lowest rate of reading by fourth-grade pupils.

SUMMARY AND CONCLUSIONS

1. Summary

A brief summary of the findings reported previously is repeated here in order to provide a background for the conclusions reached as a result of a study of the influence on 1800 fourth-grade pupils of three kinds of sentences and three forms of story based on three selected stories.

(1) In the animal story, "Numskull and the Rabbit", designated as story X, the fourth-grade pupils considered in the study appeared to be most interested in stories written in either short simple sentences or in mixed sentences and least interested in stories containing long, complex, and compound sentences. They did not definitely appear to be interested in any one form of story more than another.

There was no definite evidence that stories written in either of the three forms of sentence chosen consistently ranked highest or lowest in average comprehension score. However, there was a very slight indication that stories containing direct conversation ranked highest in average comprehension score. A slight indication that stories containing indirect conversation ranked lowest was also evident.

Little agreement as to the kind of sentence ranking first in average rate scores could be found. Stories containing short simple sentences seemed to rank lowest in average rate score. Play form seemed to produce the highest rate of reading, while there appeared an almost equal rating of stories containing direct conversation and those containing indirect conversation as to the lowest average rate score.

(2) In the child activity story, "Eggs and Pomegranates" (story Y), stories with short simple sentences were liked best. There was no agreement as to the kind of sentence liked least. Pupils appeared to be almost equally interested in stories containing direct conversation and in those written in play form. They were least interested in those stories containing indirect conversation.

Stories containing a mixture of long and short, simple, complex, and compound sentences seemed to rank highest in average comprehension score. Little agreement as to the kind of sentence ranking lowest in average comprehension score was in evidence. There appeared to be rather definite agreement of data that the stories containing direct conversation ranked highest in average comprehension score; and that those containing indirect conversation ranked lowest.

Stories written in long complex and compound sentences ranked highest in average rate score; stories containing short simple sentences tended to rank lowest. Those stories containing direct conversation ranked highest in average rate score with those written in play form a close second. Stories containing indirect conversation ranked lowest in average rate score.

(3) Pupils did not seem to prefer any one kind of sentence in the Indian story, "Sacajawea, the Bird Woman" (Story Z). There was a tendency to like least those stories containing a mixture of long and short, simple, complex, and compound sentences. They preferred stories containing direct conversation and liked stories written in play form least.

There was no agreement as to the kind of sentence ranking highest in average comprehension score, and only a slight indication that mixed sentences ranked lowest. Stories written in indirect

conversation tended to rank highest in average comprehension score. Those containing direct conversation seemed to rank lowest in average comprehension score.

Stories written in long complex and compound sentences ranked highest in average rate score; those containing short simple sentences ranked lowest. Stories containing direct conversation tended to rank highest in average rate score with those in play form a close second. Stories containing indirect conversation ranked lowest.

In reviewing these facts, one is impressed with the lack of agreement in results both among stories within a story group and between story groups themselves rather than with any particular agreement of facts. However, when one considers all of the stories together and weighs the results of the experiment in detail there are some rather definite trends which are significant. A further summary of the results when all of the stories are considered together gives these indications.

Pupils seemed to be most interested in stories containing short simple sentences. Sentences containing a mixture of long and short, simple, complex, and compound sentences ranked second in interest. Pupils were least interested in stories written in long complex and compound sentences. There was a tendency to prefer stories containing direct conversation and to choose those stories containing indirect conversation least often. There was practically no evidence that the interest of these fourth-grade pupils was consciously influenced by the form of the story.

The kind of sentence contained in a story apparently had no influence on the size of the average comprehension score. There was some indication that stories containing direct conversation ranked highest in average comprehension score and that stories containing indirect conversation produced the lowest average comprehension scores.

There was rather definite evidence that stories containing long complex and compound sentences ranked highest in average rate score and that stories written in short simple sentences ranked lowest. Stories written in direct conversation or in play form produced the highest average rate scores; those containing indirect conversation produced the lowest rate score.

2. Conclusions

Accepting these data as a basis for conclusion, assuming that the 1800 pupils included in the experiment were typical fourth-grade pupils, and assuming that the stories represented typical fourth-grade reading material, an attempt is here made to answer the two questions proposed in the introduction in terms of general conclusions.

Question one: Does it make any difference in pupils' interest, comprehension, and rate of reading, whether the selection is written in short simple sentences; in a mixture of long and short, simple, complex, and compound sentences; or in long complex and compound sentences?

The answer: There is no evidence that any one of these types of sentence consistently and in every instance produces a greater interest on the part of the fourth-grade pupils studied than the other types. Also, there is no evidence that any one type of sentence consistently and in every instance produces least interest on the part of the pupils studied. The e are indications, however, that fourth-grade pupils are most interested in stories containing short simple sentences and are least interested in stories written in long complex and compound sentences.

The type of sentence in which a

story is written appears to have no influence on the comprehension of fourth-grade pupils as measured in this study.

Stories containing long complex and compound sentences produce the highest rate of reading. Stories written in short simple sentences produce the lowest rate score.

Question two: Does it make any difference in pupils' interest, comprehension, and rate of reading, whether the selection is written in the form of a play, if it is written in a form containing direct conversation, or if it is written in a form containing indirect conversation?

The answer: There is no evidence that pupils are consistently and in every instance more interested in any one form of story than in another. There is no evidence that they consistently fail to be interested in any one form of story. The results obtained do give some indication, however, that pupils prefer stories containing direct conversation, and are least interested in those containing indirect conversation.

There is no evidence that any one form of story consistently and in every instance ranks highest or lowest in comprehension scores. There is some indication that stories containing direct conversation rank highest in average comprehension score and that stories containing indirect conversation rank lowest in average comprehension score.

Although no one form of story consistently produces higher rate scores than another, stories written in direct conversation or play form seem to produce the highest rate scores. Those containing indirect conversation tend to produce the lowest rate scores.

3. Practical Application

While no claim is laid to having solved the problem of the influence of style on reading rate, comprehension, and interest, it is believed that certain practical applications can be made of the results of this study involving some specific factors in style of composition. One concludes that in preparing reading materials for fourth-grade pupils, or in selecting materials already prepared, it is essential to consider the purpose for which the material is intended. If the primary purpose is to encourage interest in reading, it will be well for a large number of the selections to contain many short simple sentences and to contain direct conversation. If the material is for the purpose of developing rapid reading, the selections may be written in play form or in direct conversation and contain many long complex and compound sentences. The facts determined in the study may serve as valuable information in selecting or preparing reading materials for remedial work.

4. Suggestions for Further Investigation

Many additional studies with regard to the influence of style of composition on interest, comprehension, and rate of reading will aid greatly in the preparation and selection of reading materials. Some suggestions are:

A study similar to this one may be made at various grade levels.

A study similar to this one may be made in which a homogeneous group of pupils selected upon the basis of results of standardized tests are chosen for the experiment.

A study may be made in which the same procedure is followed as in this study, but in which stories more similar in theme and plot are selected. For example, three Indian stories or three animal stories may be chosen.

Additional studies based on the procedure used in this study may be made in which

various measurable factors in style of composition, such as, word order in sentences, position of modifying words and phrases, use of descriptive words, length of paragraph may be chosen for experimentation.

BIBLIOGRAPHY

Articles

Belser, Danylu. "The Reading Interests of Boys", Elementary English Review, III (November, 1926), 292-96.

Blackhurst, J. Herbert. "Size of Type as Related to Readability in the First Four Grades", School and Society, XVI (December 16, 1922), 697-700.

Bruner, Herbert B. "Determining Basic Reading Materials through a Study of Children's Interests and Adult Judgments", Teachers College Record, XXX (January, 1929), 285-309.

Garnett, Wilma Leslie. "A Study of Children's Choices in Prose", Elementary English Review, I (June, 1924), 133-37.

Garnett, Wilma Leslie. "Factual versus Story-factual Material", Elementary English Review, III (October, 1926) 268-71.

Gregory, C. A. "The Reading Vocabulary of Third-Grade Children", Journal of Educational Research, VII (February, 1923), 127-31.

McKee, Paul. "'Fact' Form and 'Story' Form Reading Matter", Elementary English Review, III (January, 1926), 3-8.

Pressey, Luella C., and Pressey, S. L. "A Critical Study of the Concept of Silent Reading Ability", Journal of Educational Psychology, XII (January, 1921), 25-31.

Snyder, Edwin. "Factual versus Story Material", University of Pittsburg School of Education Journal, IV (March-April, 1929), 94-96.

Tinker, Miles A., and Paterson, Donald G. "Influence of Type-form on Speed of Reading", Journal of Applied Psychology, XII (August, 1928), 359-68.

Uhl, Willis L. "The Interest of Junior High School Pupils in Informational Reading Selections", Elementary School Journal, XXII (January, 1922), 352-60.

Wightman, H. J. "A Study of Reading Appreciation", American School Board Journal, L (June, 1915), 42.

Wissler, Clark. "The Interests of Children in the Reading Work of The Elementary Schools", Pedagogical Seminary, V (April, 1898), 523-40.

Books

Barry, J. Neilson, and Barr, Hy Max. Redskin and Pioneer, Chicago: Rand McNally and Company, 1932. Pp. 244.

Brewster, William Tenney. English Composition and Style. New York: The Century Company, 1913. Pp. x + 512.

Brewster, William Tenney. Representative Essays on Theory of Style. New York: The Macmillan Company, 1905. Pp. xxvii + 354.

Chandler, Katherine. The Bird Woman of the Lewis and Clark Expedition. Chicago: Silver Burdett and Company, 1905. Pp. 109.

Davis, Mary Gould. A Baker's Dozen. New York: Harcourt, Brace and Company, Inc., 1930. Pp. xv + 207.

Dolch, Edward William. The Psychology and Teaching of Reading. Boston: Ginn and Company, 1931. Pp. v + 261.

Fernald, James C. Expressive English. New York: Funk & Wagnalls Company, 1918. Pp. xi + 463.

Garrett, Henry E. Statistics in Psychology and Education. New York: Longmans, Green and Company, 1926. Pp. xiii + 317.

Huey, Edmund B. The Psychology and Pedagogy of Reading. New York: The Macmillan Company, 1908. Pp. xvi + 470.

Kent, Louise Andrews. Two Children of Tyre. Cambridge, Massachusetts: The Riverside Press, 1932. Pp. 233.

O'Brien, John A. Silent Reading. New York: The Macmillan Company, 1921. Pp. xiv + 290.

Paget, Violet (Vernon Lee). The Handling of Words, and Other Studies in Literary Psychology. London: John Lane, 1923. Pp. ix + 315.

Shaw, Edward R. School Hygiene. New York: The Macmillan Company, 1908. Pp. xi + 260.

Thomas, Joseph M., Manchester, Frederick A., Scott, Franklin W. Composition for College Students. New York: The Macmillan Company, 1925. Pp. xvi + 577.

Uhl, Willis L. The Materials of Reading. Chicago: Silver, Burdett and Company, 1924. Pp. xiv + 386.

Monographs

Ayer, Adelaide M. Some Difficulties in Elementary School History. Teachers College Contributions to Education, No. 212. New York: Teachers College, Columbia University, 1926. Pp. xi + 70.

Daringer, Helen Fern. A Study of Style in English Composition Based upon Text Books. New York: Teachers College, Columbia University. Pp. iii + 56.

Dunn, Fannie W. Interest Factors in Primary Reading Material. Teachers College Contributions to Education, No. 113. New York: Teachers College. Columbia University, 1921. Pp. 70.

Gray, William Scott. Summary of Investigations Relating to Reading. Supplementary Educational Monographs, No. 28. Chicago: Department of Education, The University of Chicago, 1925. Pp. vii + 275.

Gray, William Scott. Summary of Reading Investigations. Supplement No. 3, A Continuation of Monograph No. 28. Chicago: Department of Education, The University of Chicago, (July 1, 1926 to June 30, 1927). Pp. 48.

Gray, William Scott. Summary of Reading Investigations. Supplement No. 4, A Continuation of Monograph No. 28. Chicago: The Department of Education, The University of Chicago, (July 1, 1927 to June 30, 1928). Pp. 29.

Gray, William Scott. Summary of Reading Investigations. Supplement No. 5, A Continuation of Monograph No. 28. Chicago: Department of Education, The University of Chicago, (July 1, 1928 to June 30, 1929). Pp. 30.

Hilliard, George Horatio. Probable Types of Difficulties Underlying Low Scores in Comprehension Tests. University of Iowa Studies in Education, Vol. II, No. 6. Iowa City: University of Iowa, 1924. Pp. 60.

Judd, Charles Hubbard and Buswell, Guy Thomas. Silent Reading: A Study of the Various Types. Supplementary Educational Monographs, No. 23. Chicago: Department of Education, The University of Chicago, 1922. Pp. xiv + 160.

Uhl, Willis L. Scientific Determination of the Content of the Elementary Course in Reading. University of Wisconsin Studies in the Social Sciences and History, No. 4. Madison, Wisconsin: University of Wisconsin, 1921. Pp. 152.

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A PLACEMENT STUDY IN SECONDARY SCHOOL ECONOMICS

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NEED FOR PLACEMENT STUDIES IN CURRICULUM MAKING

It is generally recognized by progressive educators that subject matter is of value only as it contributes to certain educational aims or objectives. These aims are now usually stated in terms of pupil development such as the ability to solve problems scientifically, the ability to perform certain tasks, the ability to appreciate the finer things of life, and the development of certain attitudes and understandings.

Curriculum makers have given most of their time to the determination of objectives and the selection of subject matter and teaching techniques, but have done very little in the scientific placement of the materials of the curriculum. In the past placement has been made chiefly on the basis of so-called expert opinion. While this is necessary in getting a curriculum to functioning, this method should be followed by scientific studies to determine the degree of correctness of placement.

Placement, however, cannot be made by grade alone. We know that all children of the same grade or chronological age are not equally capable of gaining the same understandings or of developing the same abilities. Consequently, if placement studies are to be of much value to curriculum workers they must produce data which will aid in developing a curriculum adjusted to the abilities of the individual pupils. Our problem is not to determine at what grade level a certain concept can be taught but rather to determine the mental ability and other factors essential to the understanding of the concept under given learning conditions. At the present time there are very little scientifically derived data to aid in placement of the materials and activities of the curriculum.

STATEMENT OF THE PROBLEM

The purpose of this study was to determine the extent to which high school juniors and seniors of different mental age levels could gain an understanding of certain economic concepts and problems; namely, those of price, money, and banking.

PROCEDURE OF THE STUDY

Problems of price, money, and banking were selected chiefly because they were very closely related; they formed the chief topic of conversation at the time the experimental teaching was being done during the winter of 1933-34; and are important parts of every secondary economics curriculum and text. Numerous other topics in the social studies field could have just as well been chosen.

The study was made in four California high schools in the cities of San Jose, Santa Cruz, Palo Alto, and Redwood City. In all, ten different classes in economics and United States history cooperated. In addition the units were taught in two classes in lower division economics in the San Jose State Teachers College. Three of the high school classes were taught by the writer.

The problems of price, money, and banking were organized into teaching units, and all teachers agreed to follow the same teaching procedures with equal time allotments. The teaching and testing time for each class was approximately forty clock hours, which is a considerably more liberal time allowance than is possible under the usual semester course in economics in high school.

The problems of price, money, and banking were organized into three closely related units. Each unit, so far as the mimeographed materials placed in the hands of the teacher and the students were concerned, had two parts. The first part, which was given to each student, contained a list of the objectives in terms of understandings to be gained from the unit, followed by a statement of problems which must be solved if the understandings were to be gained. The second part of the unit contained suggested activities in which teacher and class should engage if the problems of the unit were to be understood. Reliable objective tests were constructed to measure understanding of each of the several concepts of each unit. The problem solving technique was followed generally in the teaching procedure. Each class was furnished considerable mimeographed reading materials on money and banking to be used in addition to available texts and references. An illustration will help to make clear the organization and procedure.

One of the objectives of the money unit was that of gaining an understanding of the factors determining the value of money. Problem IV of the money unit was "To understand the most important monetary principles and practices." Problem V was "How is the real value of money determined?" Under these two problems were listed nine sub-problems such as the three presented below:

A. What are the effects of inflation and deflation of currency? Consider the following: (1) Effect upon creditor class. (2) Effect upon debtor class. (3) Effect upon prices, production remaining the same. (4) Relation to business cycle. (5) What persons usually wish inflation? Under what conditions?

B. Explain the difference between real and apparent income, price, wages, profit, savings.

C. How is the real value of the dollar determined? Explain the price index as a measure of the value of the dollar.

An objective test of eight multiple answer type items, each having four answers, and four sections of a modified true-false type involving 25 separate items to be checked was constructed to measure the extent to which the students of different mental age levels gained an understanding of the factors determining the value of money. The following is typical of the eight multiple answer items:

> Mr. X has borrowed $4000 from the bank, giving a mortgage on his apple orchard. At the time the loan was made apples were selling at $1 a box. The general price level, including apples has increased 50% when the loan comes due. Considering real rather than apparent value, and disregarding the interest
>
> 1. Mr. X is paying back less than he borrowed.
> 2. Mr. X is paying back more than he borrowed.
> 3. Mr. X is paying back the same that he borrowed.
> 4. Mr. X is paying back about double what he borrowed.

The students were asked to check the best one of the four answers. In the following example of one of the modified true-false sections the students were asked to draw a circle around the number before each of the true statements. Each section had from five to eight items.

> Country Y has been enjoying several prosperous years. However, as a result of several factors, conditions change rapidly, resulting in price slashing and

credit and money deflation. Considering this situation, draw circles around the numbers of the true statements.

1. Persons on a salary, provided they didn't lose their jobs, would benefit at first.
2. The creditor class would be hit harder than the debtor class, even though the debts were paid.
3. A farmer, owing 2000 during good times, would now find his debt easier to bear.
4. Debtor classes would probably begin demanding inflation.
5. A creditor would gain by deflation, provided debts were paid.
6. Bankers would be less willing to loan money to business men.

Each of the sixteen areas into which the three units were divided were organized and tested in a manner similar to the above illustration. These areas are presented later.

The problem of determining what shall constitute understanding of an economic problem or principle presents many difficulties. While many economic principles are relatively stable, the problems themselves are continually shifting, and require constant study if a person is to have even a fair degree of understanding of them. One has only to read the conflicting opinions of experts in the field of economics to realize that there are great differences of opinion among these men in interpreting problems of price, money, and banking. However, this only makes a placement study of this type more difficult, and does not lessen the value of the conclusions if one keeps in mind the natural conditions under which such data must be derived. Consequently, any standards setup to determine the degree of mastery cannot be anything except arbitrary. However, it seems reasonable that if a student obtains a score of 75% or better after that score has been corrected for guessing that he does have at least a fair understanding of a group of concepts such as those determining the value of money. Also, it would seem that unless the majority of the class gained such understanding of the concepts being taught that they were too difficult, as taught, for the class, and that either such concepts should be eliminated, or the teaching procedures changed and the time allotted to the teaching considerably increased. For the purpose of this study it was assumed that if a majority of the students made scores of 75% or more on a test over a given area, after the test had been corrected for guessing, the concepts involved were within the understanding of that group. If a majority of the students made scores of 50% or more, but less than 75%, the concepts were labeled as doubtful for the group, and too difficult, as taught, if a majority of the pupils of a given group made scores of less than 50%.

The high school students were classified into three groups on the basis of their mental ages as determined by the Terman Group Test of Mental Ability, Form B, which was given to all students at the beginning of the study. As all students participating in the study had passed their sixteenth birthday the intelligence quotients and mental ages are directly comparable.

Group I consisted of the upper 25% of the students. All of the students in this group had an I.Q. of 115 or better, and a M.A. over 18 years 4 months. Group II consisted of the middle 50% and Group III of the lower 25% of the students. The I.Q. range of the lower group was from 76 to 98, and that of Group II from 99 to 114 inclusive. Group I students had mental ages of 15 years, 9 months or less.

241 high school students completed the price unit, 208 the money unit as well as the price unit, and 163 the banking unit. Because of the time required, one history class completed only the price unit, and another took only the price and money unit. As final tests were administered at the completion of each unit it was possible to use these data.

The college students were divided into three groups on the basis of their national percentile standings on the Thurstone Psychological Examinations given at the beginning of their freshman year.

The tests on all three units were given at the beginning of the teaching period. At the close of each unit the test over that unit was repeated.

DESCRIPTION OF AREAS AND TESTS

Price I was a test devised to measure understanding of the inter-relationships of supply, demand, and price. Price II tested an understanding of factors other than those of Price I such as effects of changing styles, tariff, or changing money values. Price III tested an understanding of terms common to discussions of monetary problems. Price IV was the total test, and the scores were obtained simply by adding the scores of the three tests above.

Money I was devised to test for an understanding of facts pertaining to, and largely descriptive of the United States monetary system such as the types of money in use, and the meaning of the gold standard, dollar, and ratio of coinage. Money II was a test of monetary principles such as those known as Gresham's Laws, and the need for elasticity and convertibility in a monetary system. Money III tested for an understanding of the factors affecting and determining the value of money. Money IV was devised to test the student's understanding of the theories upon which plans for a managed monetary system are based. Under this would come the Commodity Dollar plan for stabilizing prices. Money V tested for an understanding of foreign exchange problems in relation to our monetary system. Money VI was a test of the understanding of terms common to monetary discussions. Money VII was the total test on money.

Banking I tested for an understanding of the function and operation of a commercial bank. Banking II was devised to test for an understanding of what are generally recognized as good banking principles as they apply to both the organization and operation of a commercial bank. Banking III was a test on the operation of the Federal Reserve System. Banking IV tested for an understanding of the banking regulations of the United States. Banking V was a test on the causes of the orgy of bank failures from 1920-1930. Banking VI was not strictly a banking test but covered all of the business cycle as it related to price, money, and banking. It was included in the banking unit in order that it would come at the end of the teaching period after all factors relating to the three units had been considered. Banking VII tested for an understanding of terms common to discussions of banking problems. Banking VIII was the total test on this unit.

CONCLUSIONS AND IMPLICATIONS

Table 1 presents the specific conclusions regarding the difficulty of the different areas for each of the three groups of high school students. The probable errors of the proportions, obtained by the use of the formula

$$P.E._p = .6745\sqrt{\frac{pq}{n}}$$

were taken into consideration in determining the difficulty of an area for a given group of students.

	Group I (I.Q. 115 plus)	Group II (I.Q. 99-114)	Group III (I.Q. 76-98)
Price I	understandable	doubtful	doubtful
Price II	understandable	doubtful	too difficult
Price III	understandable	understandable	doubtful
Price IV	understandable	doubtful	too difficult
Money I	understandable	too difficult	too difficult
Money II	understandable	understandable	too difficult
Money III	understandable	doubtful	too difficult
Money IV	doubtful	too difficult	too difficult
Money V	understandable	too difficult	too difficult
Money VI	understandable	understandable	too difficult
Money VII	understandable	doubtful	too difficult
Banking I	understandable	doubtful	too difficult
Banking II	doubtful	doubtful	too difficult
Banking III	doubtful	doubtful	too difficult
Banking IV	doubtful	too difficult	too difficult
Banking V	understandable	understandable	too difficult
Banking VI	understandable	understandable	doubtful
Banking VII	understandable	understandable	too difficult
Banking VIII	understandable	doubtful	too difficult

Table 1, showing difficulty of each area, as indicated by test score on final test, for each of the three groups of high school juniors and seniors.

The writer believes the following general conclusions and implications are justified by the data derived from this study:

1. Taken as a whole, the concepts involved in this study are entirely too difficult for the high school students of Group III and for large numbers of Group II. This study is broad enough in its scope to cast considerable doubt on the advisability of attempting to teach economics to any but students of better than average ability without greatly modifying the content, procedures, and time allotments of the course.

2. The amount of overlapping in the scores between the high school students of Groups I and II and between those of Groups II and III on the tests over the units is proof of the inadvisability of segregating students in economics on the basis of their mental ability as determined solely by intelligence tests. Their ability in economics should be an important factor. This is in line with the findings of numerous studies made to determine the effectiveness of the I.Q. or M.A. as an indicator of probable success in a given academic field. There is some overlapping between Groups I and III, being between 10% and 20% on most final tests. The overlapping in the case of the college students is much greater than in the case of the high school students. This is especially true of Groups I and II where the lines of the percentile graphs cross on several occasions.

3. Most of the concepts taught in this study are within the understanding of the high ability high school student as taught, although at some points especially in the banking unit, the time for study needs to be lengthened if it is felt that understanding is essential at these points.

4. The fact that on the great majority of the tests the high school students of Group I made better scores on the pre-test than did the Group III

students on the final test is evidence of the need for truly differentiated courses in economics with different content, teaching procedures, and time allotments. After several weeks of study the students of Group III still lacked the degree of understanding of most of the concepts possessed by Group I students at the beginning of the study.

5. The high ability high school students are at least as capable as the college students of Group I in the field of economics, and can study with understanding any of the concepts that can be included in the curriculum for high ability college freshmen and sophomores. The same is not true for the students of Group III where the performance of the college group was considerably better than that of the high school group. However, neither the high school nor the college students of Group III demonstrated ability to understand economic concepts as they were taught.

6. Taken as a whole, the concepts involved in this study are within the understanding of the majority of college students of Group I, but entirely too difficult for the students of Group III. No generalization can be made for the Group II students. Each area must be considered individually.

7. There is a growing demand on the part of many outstanding educators and laymen that the public schools develop, on the part of the students, an understanding of the more important economic, social, and political problems faced by the American people. The results of this study raise grave doubts as to the possibility of doing this without fundamental curriculum changes. The teaching procedures used in this study, while probably superior to those of the average high school economics class, were still largely representative of the subject-matter approach. Under these procedures and time allotments few students of average and less than average mental ability gained what could be called an adequate degree of understanding of most of the concepts of the units taught.

Whether the development of a well articulated social studies core based on real life problems and taught by teachers committed to the philosophy of the activities curriculum would result in a higher degree of understanding will be known only after careful experimentation covering a period of several years. The writer is confident that we could, at least, come much nearer the desired goal than we are now doing.

8. The present study indicates that most of the economic concepts of the units taught are of too great a degree of difficulty for any but the higher ability students of the high school and the lower division of the college, given present teaching procedures and time allotments. This raises the question as to the possibility of the average man voting intelligently on the many complex social, economic, and political questions placed before him at every election. Experimental studies of the abilities of adults to understand such problems need to be made. The present long-range tendency in our democracy has been to increase the responsibility of the voting population through the use of the initiative and referendum. Certainly this study, based as it is on the more or less artificial conditions of the classroom and utilizing high school and lower division college students, should not be used as conclusive evidence that the average adult is incapable of understanding many of the questions on which he is called to render a decision. It does indicate, however, that our present educational program is not developing such understanding of our major economic issues, and raises considerable doubt as to the ability of a large number of the persons gaining a degree of understanding essential to intelligent voting directly upon such issues.

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AN ANALYSIS OF THE NEW YORK STATE REGENTS EXAMINATIONS IN CHEMISTRY FROM 1927 to 1934

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This study is the result of an attempt, first, to determine over an eight-year interval the nature and distribution of the content of the New York State Regents Examinations in chemistry, and, second, to ascertain the frequency with which objective questions were used during this period of time in these examinations. Incidental to the major part of this study, a few correlations were computed between the results on the Regents Examinations and certain standardized chemistry tests.

A study of this nature would seem to have ample justification. An examination which is used to determine annually the success or failure of more than thirty thousand students carries a tremendous responsibility. It has been suggested that since the examination committee does not have an opportunity to engage in an extended research in the formation of each examination, their work, although the product of teachers and others of recognized merit, represents the collective judgment of the group rather than scientific findings. Such being the case, there would seem to be opportunity for error to develop in the test construction, and such an objective study as this might be of value to those interested in these or similar examinations.

Content Analysis

The questions of each of the fifteen Regents Examinations in chemistry were classified according to the topics given in the last (1926) revision of the New York state syllabus in chemistry, and the results stated in terms of the percentage of credit representation in each of the examinations. Both mean and median percentages were determined for the eight years.

In studying these data in Table I, one is impressed by several things, especially: (1) the relative constancy with which certain of the topics were treated in the examinations (14 of the 35 topics are included in 12 or more of the fifteen examinations); (2) the sporadic consideration of other topics (six of the 35 topics are included in five or less of the fifteen examinations); (3) the fact that, even though a given topic may be represented in all or nearly all the examinations, the percentage of the examination devoted to it may range from .66 to 12.66 (oxides of carbon), or from 4.0 to 16.0 (problems), or from 9.0 to 18.0 (formulas and equations); and (4) the fact that the number of syllabus topics represented in the various examinations ranged from thirteen to thirty of the thirty-five significant topics. An indication of the thoroughness of the analysis made appears in the fact that only about six per cent of the material was not allocated among the thirty-six topics. The regular occurrence of questions of the unclassified variety on the last five examinations is interesting in that they were usually of the type: "Name three reducing agents."

Table I

PERCENTAGE OF CLASS TIME, TEXTBOOK PAGES AND REGENTS EXAMINATION CREDIT GIVEN TO THIRTY-SEVEN DIVISIONS OF THE NEW YORK STATE SYLLABUS FOR CHEMISTRY

Syllabus topics	Class time per cent	Textbook space per cent	Examinations--per cent of total credit on each of the syllabus topics																
			Jan. 1927	June 1927	Jan. 1928	June 1928	Jan. 1929	June 1929	Jan. 1930	June 1930	Jan. 1931	June 1931	Jan. 1932	June 1932	Jan. 1933	June 1933	Jan. 1934	Mean	Median
1. Introduction	3.00	2.43	.66	4.00	1.33			6.66	1.33			4.37			.66		1.33	1.35	.66
2. Oxygen	2.25	3.90	7.33		.66		.66	3.00	.66			10.31	5.33			.66	.66	1.95	.66
3. Hydrogen	3.75	3.41	4.33				6.00	1.00			6.66		1.33	1.87	6.00		.66	1.85	.66
4. Hydrogen compounds	3.75	3.65	3.33	8.00	2.66	1.33	2.00	.66		3.33	1.33	1.25			.66	1.33	2.00	1.85	1.33
5. Important laws	.75	.73	.66		6.66			.66										.53	.00
6. Atomic theory	1.50	2.19	.66									1.25				1.33		.21	.00
7. Electron theory	4.51	4.87			1.33	6.66	6.66	6.66		8.00	1.33	8.12	7.33	5.62	7.33	7.33	6.66	4.86	6.66
8. Formulas and equations	12.02	4.63	10.66	12.66	11.00	18.00	12.66	16.66	16.00	9.33	12.00	18.12	14.00	14.06	9.66	16.66	17.33	13.92	14.00
9. Problems	9.02	3.90	6.66	16.00	16.00	14.00	15.33	14.00	10.66	10.66	9.33	10.00	7.33	5.00	5.33	10.66	4.00	10.33	10.66
10. Sodium	.75	1.70	.66			1.33					1.33	.62			2.00			.39	.00
11. Sodium compounds	3.00	4.87		6.00	2.00	2.66	.66	2.00	4.00	1.33	2.00	2.50	9.33	4.37	1.33	1.33		2.63	2.00
12. Chlorine	3.00	2.68	4.00		2.00	.66	2.66	1.66	6.66		1.33	.31		.62	5.00	1.33		1.74	1.33
13. Hydrochloric acid	3.00	2.68				6.66	.66	1.00	.66	2.00	8.66	1.56	.66		.66	6.66	1.33	2.03	.66
14. Sulphur	2.25	2.19	1.33	6.66		1.33	2.00	2.00	.66	.66	6.66			3.75	1.32			1.75	1.33
15. Hydrogen sulphide	1.50	.97				.66	6.00	1.00	2.00		3.33		.66			1.33		.99	.00
16. Sulphur dioxide	1.50	1.21	1.33		6.00	2.00		.33	1.33	3.33		1.87		1.25	1.33	3.33	.66	1.51	1.33
17. Sulphuric acid	1.50	1.70	1.33		5.66	9.66	.66		2.00	1.33	2.66	2.50	1.33	1.25	2.00	3.33	8.66	2.82	2.00
18. Ionization hypothesis	3.00	3.90	6.00	1.33	4.00	2.66	8.66	2.66	7.33	4.66	8.66	7.50	8.00	6.25	6.66		8.00	5.49	6.25
19. Completion of reactions	3.00	3.41	4.66				4.00			.66	1.33	1.25			1.33		1.33	.97	.00
20. Nitrogen and the air	2.25	3.41	.66		1.33	.66	.66	6.33	.66	6.66			.66	1.25	2.00	2.00	.66	1.56	.66
21. Ammonia	1.50	1.95	7.33		7.33	1.33	1.33	3.66	1.33		2.00	1.56	.66	3.75	.66	3.00		2.26	1.33
22. Nitric acid	3.00	3.17	1.33			.66	6.66	7.66	4.00	1.33			8.00	1.87	1.33		2.66	2.36	1.33
23. Halogens	4.51	4.63	.66			6.00		.66	2.00	1.33	1.33	1.25	6.66	2.50		1.33	8.66	2.15	1.33
24. Carbon	1.50	4.87	5.33		6.66	.66	4.00	1.33			6.66	.62	1.33	1.25		.66		1.90	.66
25. Oxides of carbon	3.00	4.63	3.00	12.66	.66	.66	1.33	2.33	.66	8.66	4.00	1.87	2.66	8.75	2.66	6.00	2.33	3.88	2.66
26. Calcium carbonate	1.12	1.46	2.00		1.66					2.00	2.00	6.87	.66	1.87	6.66		.33	1.60	.66
27. Calcium oxide	.75	1.46	4.00	6.66	4.66			7.33	6.66	.66		.62	.66	.62	2.00	.66	.33	2.32	.66
28. Other calcium compounds	1.12	1.21			1.66	.66		.66		1.33		.62			3.33	2.00		.68	.00
29. Extraction of metals	3.00	5.12	8.00	6.00	2.66	4.00	5.33			4.66			7.33	2.18		2.00		2.81	2.18
30. Refining of metals	1.50	2.68	.66	6.66	5.33	2.66	6.66		6.66	.66	.66			3.12	6.66	6.66	2.66	3.27	2.66
31. Alloys	1.50	1.70	.66			.66	1.33			7.33	9.33	6.25		6.25	2.00			2.25	.66
32. Electrochemical series	.75	.24	1.33								2.00		6.66				1.33	.75	.00
33. Minerals	.75	.73								.66		.31						.06	.00
34. Hydrocarbons	.75	1.21	1.33			.66		1.33	.66	.66	1.33	.93	.66	2.50	4.00	1.33	.33	1.04	.66
35. Mixtures of hydrocarbons	1.50	1.46	1.33	3.33			2.66		.66									.53	.00
36. Other organic compounds	4.51	4.87	8.66	10.00	6.66	8.00	.66	1.33	2.00	10.66	1.33	1.56	3.33	8.75	6.66	5.33	4.66	5.30	5.33
37. Unrelated laboratory work	3.75					5.00			2.66	4.00	2.66	2.50		2.50			2.66	1.46	.00
38. Unclassified								6.00	18.66				2.66	8.12	8.66	9.00	13.00	4.40	
39. Non-syllabus					2.00	.66	.66	1.33		4.00		3.43	2.66	.62	2.00	4.66	7.66	1.97	

In endeavoring to study the examinations from the standpoint of validity, two feasible criteria suggested themselves; the percentages of textbook space devoted to the various topics, and the percentages of class time given by one of the writers to the syllabus topics. If it could be shown that either the author of the text or the teacher of the class had distributed his emphasis on the basis of data obtained by means of a social analysis technique, then particular significance could be attached to that measure. Such is, unfortunately, not the case. The findings are, therefore, presented as being only crudely indicative of validity. The product moment correlations are shown in Table II.

Table II

CERTAIN VALIDITY CORRELATIONS ON THE REGENTS EXAMINATIONS

Distribution of	Text-book space	Exam. credit (Median)	Exam. credit (Mean)
Class time*	.62	.89	.91
Textbook space	--	.52	.53
Exam. credit (Median)	--	--	.98

*A ninety-minute laboratory period was counted as one class period. Review and testing periods were not considered due to their being distributed, for the most part, over various topics.

These correlations were computed on the basis of thirty-six topics. The relationships between the percentages of examination emphasis and class time emphasis would seem to be pleasingly high, yet not so high as to indicate an undesirable subservience to the examinations. No explanation is attempted for the lower, but still probably significant, correlations between percentages of examination emphasis and textbook space.

Certain further evidence of validity may be found in the product-moment correlations between various Regents examinations and the Powers Test, Form A. Five different correlations found were .810 (in 1927, 20 cases); .839 (1928, 29 cases); .722 (1932, 55 cases); .731 (1933, 70 cases); and .700 (1934, 50 cases). In 1934, the Columbia test (Form B) and Regents correlated .78, the Columbia-Powers correlation was .842 --both being based upon 50 cases.

Objectivity of the Examinations

A tabulation of the question values for each of the fifteen Regents examinations was made, using the categories shown in Table III. The "old type" questions were analyzed into three groups. The "subjective" group contained those questions the marking of which depended in a large measure on the judgment of the examiner. It included all questions calling for explanations, descriptions, construction of diagrams, etc. It also included some short-answer questions which could be answered in several ways--some of which might be considered good answers and others poor. "Name three methods that may be used to prevent decay", is typical of that form of question. The "intermediate" questions were those short-answer questions which allowed very little opportunity for differences of opinion on the part of examiners but were not classed as objective because they did not require only one definite answer. "Write an equation for the preparation of carbon dioxide from marble" could be answered correctly by the equation for the heating of calcium carbonate or by the equation for the action of hydrochloric acid on calcium carbonate. Likewise, "Name two uses of carbon dioxide" could receive several correct answers. Both of these questions could be exactly scored by any teacher familiar with the New York State requirements; but since they were not limited to a single answer, they were rated as "intermediate." The third and last subdivision was reserved for those questions which called for a brief and very

definite answer. It included problems, questions calling for certain formulas and equations, and other questions which required so exact an answer that it could be rated correctly by anyone familiar with the subject matter. Both objective old type and the new type questions were used in finding the total of objective credits.

Summary and Conclusions

An analysis of fifteen Regents examinations over an eight-year period showed the following conditions:

1. There was a marked variation in the number of topics tested from examination to examination. Out of thirty-five significant topics, the range was from thirteen to thirty.

Table III

TYPES OF QUESTIONS FOUND IN THE REGENTS EXAMINATIONS FROM JANUARY 1927 TO JANUARY 1934, INCLUSIVE AND CREDITS ASSIGNED TO EACH TYPE

YEAR	OLD TYPE			NEW TYPE						Per Cent Objective Questions
	Subj.	Intermed.	Obj.	True-False	Matching	Completion	M-C	Correction of Error	Total Points Credit	
Jan. 1927	85	15.0	32.0	10	8	-	-	-	150	33.33
June 1927	88	16.0	46.0	-	-	-	-	-	150	30.66
Jan. 1928	78	16.0	56.0	-	-	-	-	-	150	37.33
June 1928	49	10.0	71.0	-	-	20	-	-	150	60.66
Jan. 1929	66	15.0	49.0	-	-	10	10	-	150	46.00
June 1929	39	13.0	58.0	-	10	20	10	-	150	65.33
Jan. 1930	52	22.0	36.0	-	-	30	10	-	150	50.66
June 1930	47	23.0	40.0	5	10	14	11	-	150	53.33
Jan. 1931	55	10.0	45.0	-	-	21	15	4	150	56.66
June 1931	50	20.0	50.0	-	-	22	10	8	160	56.25
Jan. 1932	68	6.0	36.0	-	-	30	10	-	150	50.66
June 1932	72	14.5	53.5	-	-	20	-	-	160	49.53
Jan. 1933	75	5.0	30.0	-	-	30	10	-	150	46.66
June 1933	42	12.0	26.0	-	-	60	10	-	150	64.00
Jan. 1934	54	8.0	38.0	-	-	45	5	-	150	58.66

An inspection of Table III shows an interesting tendency, viz: a trend toward a more objective examination. For the first three papers analyzed, the percentage of total credit based on objective questions was 33.77, while for the last three it was 55.86. A definite increase in objectivity occurred in June 1928; and although there has been some variation since that time, none of the examinations has fallen back to the 1927 status.

2. The amount of credit emphasis upon any given topic varied greatly from year to year, even though the topic may have been provided for in each of the fifteen examinations. The amount of credit emphasis given to problems, for instance, ranged from four to sixteen per cent; to oxides of carbon, from one to thirteen per cent.
3. While there was a significant increase over the eight-year period in the percentage of objective questions

used in these examinations, those constructing the tests have not given away completely to the objective questions. From 40 to 50 per cent of the credit on the examination may be earned, or lost, through questions judged to be subjective.

Implications

Excessive variation in content emphasis would seem to indicate a lack of definite educational policy with respect to the construction of the Regents examinations, but it should be pointed out on the other hand that examinations need to be kept "alive" to the changing demands not only of society but of the science itself. It would seem, however, in light of the syllabus adopted by the state and possibly in light of the text or texts widely used, that better sampling and emphasis could be provided.

Whether or not the Regents examinations should be made more objective is, as far as the writers are concerned in this study, only a matter of opinion. It is hoped, however, that the curve of objectivity found in this analysis will not flatten out for some time yet.

THE OVERLAP OF CHILD AND ADULT WRITING VOCABULARIES

by
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The degree of overlapping of vocabularies is of considerable importance to curriculum builders. In recent years particularly in the field of spelling there has been controversy concerning the use of child and adult writing vocabularies in word selection. Some authorities have contended that the important words for a spelling curriculum are those of permanent value, of adult usage, while others have maintained that words of purely childish use and interest should be taught in addition to words of permanent value. Since both points of view are valuable in setting up the criteria for the choice of a core curriculum in spelling, it seems worth while to note the similarity and contrast of adult, high-school, and elementary-school writing vocabularies.

One hundred words of the highest credit in Horn's Study, A Basic Writing Vocabulary,[1] were ranked in numerical order and a comparison of these rankings was made with the frequency rankings of these words in Ashbaugh's High-School List,[2] and Fitzgerald's Elementary-School List.[3] Table I presents the findings of this comparison. For example, the word I ranks first in the three lists; and ranks third in the three lists; the ranks second in adult writing and fourth in the other studies; to ranks fourth in Horn's list and second in Ashbaugh's and Fitzgerald's.

It is interesting to compare the ranking of each word in the three lists. A few more comparisons are selected at random. The word be ranks seventeenth in adult writing, thirty-ninth in high-school writing, and sixty-second in elementary-school writing. The word are ranks eighteenth in adult and high-school writing, and twelfth in elementary-school writing. The word not ranks nineteenth in the adult list, thirty-fourth in the high-school list, and forty-fifth in the grade list. The word she ranks forty-sixth in the adult list, thirty-fifth in the high-school list, and thirty-sixth in the elementary list; and the word he ranks thirty-ninth, forty-third and forty-fourth respectively in these lists.

Table I

RANKINGS OF THE FIRST ONE HUNDRED WORDS OF HORN'S A BASIC WRITING VOCABULARY IN ASHBAUGH'S HIGH-SCHOOL AND FITZGERALD'S ELEMENTARY-SCHOOL LIST

Word	H	A	F	Word	H	A	F
I	1	1	1	of	7	10	13
the	2	4	4	in	8	11	10
and	3	3	3	we	9	12	7
to	4	2	2	for	10	13	20
a	5	6	6	it	11	7	11
you	6	5	5	that	12	16	30

1. Horn, Ernest, A Basic Writing Vocabulary, University of Iowa Monographs in Education, No. 4, Iowa City, Iowa: University of Iowa, 1926.
2. Ashbaugh, E. J., Vocabulary of High-School Pupils' Letters. Unpublished, Iowa City, Iowa: University of Iowa.
3. Fitzgerald, James A., The Vocabulary, Spelling Errors, and Situations of Fourth, Fifth, and Sixth Grade Children's Letters Written in Life Outside the School. Doctor's Thesis, Iowa City, Iowa: State University of Iowa, 1931.

Table I (Continued)

RANKINGS OF THE FIRST ONE HUNDRED WORDS OF HORN'S A BASIC WRITING VOCABULARY IN ASHBAUGH'S HIGH-SCHOOL AND FITZGERALD'S ELEMENTARY-SCHOOL LIST

Word	H	A	F	Word	H	A	F
is	13	8	8	good	57	68	85
your	14	21	14	know	58	37	75
have	15	9	9	just	59	51	57
will	16	23	19	by	60	126.5	181
be	17	39	62	up	61	54	65
are	18	18	12	day	62	88	99
not	19	34	45	much	63	95	96
as	20	26	74	out	64	60	51
at	21	30	48	her	65	64	63
this	22	28	32	order	66	421.5	1157
with	23	33	39	yours	67	218	145
but	24	15	26	now	68	57	38
on	25	32	41	well	69	41	40
if	26	58	86	an	70	147	199
all	27	22	29	here	71	50	52
so	28	17	23	them	72	82	82
me	29	20	31	see	73	66	103
was	30	14	18	go	74	46	49
very	31	70	56	what	75	84	69
my	32	19	17	come	76	73	77
had	33	24	25	were	77	72	83
our	34	59	33	no	78	157	207
from	35	44	37	how	79	62	28
am	36	25	16	did	80	80.5	66
one	37	49	47	think	81	71	80
time	38	27	50	say	82	106	122
he	39	43	54	please	83	108	145
get	40	38	44	him	84	89	143
do	41	47.5	42	his	85	124	141
been	42	56	87	got	86	45	21
letter	43	53	34	over	87	86	95
can	44	77.5	88	make	88	189	236
would	45	75	76	may	89	304.5	548
she	46	35	36	received	90	135.5	127
when	47	61	53	before	91	131	190
about	48	40	67	two	92	90.5	92
they	49	47.5	55	send	93	140	161
any	50	93	112	after	94	133.5	160
which	51	169.5	271	work	95	155.5	197
some	52	63	71	could	96	113	133
has	53	77.5	78	dear	97	263	22
or	54	83	102	made	98	194	171
there	55	52	43	glad	99	107	109
us	56	103	101	like	100	55	35

Seventy-nine of the one hundred words of greatest credit in adult writing are among the one hundred most frequently used words by high-school pupils in their free writing. Seventy-six of the one hundred words of highest credit in adult writing are also common to the list of the one hundred most frequently occurring words of spontaneous child writing on the elementary-school level. In general, the rank of these words in the adult list seems to be more similar to the high-school rankings than to the elementary-school rankings.

A comparison of the vocabulary of the friendly letters of children of the Fitzgerald investigation with that of Horn's Basic Writing Vocabulary shows: that 4,927 words are common to both; that 3,300 words of the elementary list are contained in the first five thousand of the Basic Writing Vocabulary; that 1,980 words are common to the first four thousand of the Horn list and the first three thousand of the Fitzgerald list; and that 910 of the words of the elementary list are contained in the first thousand of adult writing. Of the 2,413 words found in the friendly letters of the elementary list and not found in the Basic Writing Vocabulary, 2,182 occurred four times or less; 231 occurred more than four times. In comparing the words of the elementary list with those of the Basic Writing Vocabulary only the identical forms were counted as common to both lists. There were hundreds of words of which a derived form was found in one list and the base word in the other; or one derived form in one list and another derived form in the other. If these words had been counted, the number common to both lists would have appeared considerably greater. Table II gives examples of base forms of words in one list and derived forms in the other or different derived forms in both lists.

The number of words common to both the Ashbaugh list and Fitzgerald list was 4,127. In this comparison, as in the comparison with the Basic

Table II

DIFFERENT FORMS OF WORDS IN THE ADULT AND ELEMENTARY-SCHOOL LISTS

Adult List	Elementary List	Adult List	Elementary List
wade	waded	waffle	waffles
rims	rim	ruffle	ruffles
windshield	windshields	wrench	wrenches
sinner	sinning	tile	tiles
rebellion	rebel	recite	recites
sandals	sandal	shallow	shallowest
sheer	sheered	shield	shields
sigh	sighing	sole	soles
mop	mopping	overflow	overflowed
peer	peered	modified	modifies
plot	plotting	pool	pools
quart	quarts	radiator	radiators

Table III

DIFFERENT FORMS OF WORDS IN THE HIGH-SCHOOL AND ELEMENTARY-SCHOOL LISTS

High-School List	Elementary List	High-School List	Elementary List
marshmallow	marshmallows	memorandum	memoranda
mechanic	mechanics	moments	moment
motion	motions	muscle	muscles
storehouse	storeroom	sunburned	sunburn
thimble	thimbles	vessel	vessels
wade	waded	wigs	wig

Writing Vocabulary, it was found that there were many words which were common to both lists in different forms; these were not counted in the overlapping vocabulary. Examples of words common to both lists in different forms are given in Table III.

A summary follows: Three investigations were used for comparison of adult, high-school, and elementary-school vocabularies. Horn's A Basic Writing Vocabulary includes 10,000 words most commonly used in adult writing. This list was compiled through a study of more than 5,000,000 running words of practically all types of adult writing. Ashbaugh's study culminated in a list of 6,324 different words tabulated from 195,727 running words of 741 letters written by Junior and Senior high-school girls. Fitzgerald's investigation reported 7.587 different words tabulated from 470,046 running words contained in 3,184 fourth-, fifth-, and sixth-grade friendly letters written in life outside the school and 320 business letters of elementary-school children.

A comparison of adult, high-school, and elementary-school vocabularies is interesting because of the significant overlapping which exists among them. There is a high relationship in the rankings of the first hundred words in these vocabularies.

Inspection shows that the rankings of the first hundred words of the high-school and adult lists are a little more similar than those rankings of the adult and elementary lists. It seems evident, also, that the rankings of the most common words of the elementary and high-school lists are more similar than those rankings of the elementary and adult lists. Although there is a large overlap in the three vocabularies, there are differences particularly in marginal and infrequently used words. Not only are these differences shown by the appearance of different words, but they are also indicated by the occurrence and absence of various forms of the same stems in the different lists.

TEACHERS AS CITIZENS

by
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Problem:

Recent developments in the field of curriculum construction have greatly increased the importance of teachers' attitudes in regard to their influence upon both the content and presentation of course material. Where teachers' committees are used to revise the course of study, decisions as to what should be included are made--often unknowingly --in reference to some system of values, a frame of reference acquired in the constant interplay of reactions between the individual and his environment. The instructional techniques which seek to model the day-to-day content of teaching in accordance with child needs and interests give even greater play to the teacher's interests; persons familiar with experimental schools believe that, as far as curriculum content is concerned, the interests of the instructor really receive greater weight than those of his pupils. For example, when we note that pupils of one teacher year after year display an interest in the causes of war, while pupils in the same grade, taught by another teacher, perennially exhibit intense concern with the Problems of the Orient, then we begin to suspect that the instructor assumes the dominant role in de facto curriculum construction. The process seems to be that the enthusiasms of the teacher awaken a sympathetic response in his class.

Perhaps enough has been said to establish the assumption that teachers, in their classrooms and in curriculum construction committees, are being given increasing freedom to shape the content of instruction. From this it follows that the attitudes, values, and interests of teachers must be understood and appraised in any scientific study of modern educational methods.

The teacher, especially the teacher in a progressive school and the teacher of the social studies, must make many decisions concerning what topics to include, and how to deal with them. In most cases, such decisions are made offhand, on the basis of unacknowledged attitudes and interests, rather than on the basis of thorough and deliberate consideration. There is evidence for believing that the activities of teachers, outside of school, influence the attitudes which find expression in their classroom work. (As reported later in this article, thirty-six, out of fifty, teachers so testified.) Hence, an understanding of the teacher as a citizen may aid us in treating some of the weighty problems raised by recent trends in education.

This article is a report of an exploratory investigation into the citizenship activities of American teachers. The research was an attempt to secure as broad as possible a picture of the situation rather than to make a more definitive research into one aspect of the problem.

Procedure:

An elaborate interview schedule was prepared after consultation with educational psychologists, school administrators, social psychologists, sociologists, and psychiatrists of various schools. Each aided by stating what items he thought should be included and by helping to phrase the questions and to develop interview methods calculated to secure the desired information. The schedule of questions was reduced sufficiently to enable the average interview

to take one hour; additional items, requiring quickly given answers, were placed in a supplementary questionnaire.

Since the purpose of the study was to elicit the maximum amount of information from each person, in order to furnish leads for later research of greater scientific accuracy, considerations regarding the ease with which the data could be manipulated statistically were given but minor weight in shaping the interview. As will be reported subsequently, the complexity of the data did, in fact, prevent comprehensive statistical treatment.

The interview schedule and the supplementing questionnaire called for more than 150 items of information. The time required for completing the interviews ranged from forty-five minutes to three hours. At the beginning of the interview the subject was asked to name the social problems which held most interest for him. The problem of greatest interest to the subject was then selected for further discussion, and he was asked to describe those of his activities which were motivated by interest in the problem selected. At this point, two check lists were used: one listed individual activities, the other actions of organizations which the subject had joined because of interest in the social problem. The check list of individual activities contained such items as:

Talked to friends about the problem
Bought books dealing with the problem
Wrote letters to newspapers
Joined an organization
Electioneered
Formed an organization

The check list of organizations' activities contained items such as:

Organization held meetings for private discussion
Organization circulated petitions
Organization published educational material
Organization organized boycotts

The check lists were followed by a series of questions seeking to find out the history and ramifications of the interest, as seen by the subject. Among the questions were:

When did you first become interested in this problem?
How did you come to be interested in it?
What groups in your community do you regard as allies in achieving a desirable solution? Which groups are foes?

Another set of questions, dovetailing with those last mentioned, sought to appraise conditions in the community and the school system where the individual lived and worked. Examples are:

Could you have become more active without your activities being brought to the attention of your superiors in the school system?
Did the majority of people in your community favor those with your point of view?
Did school authorities view your interest with approval or disapproval?

Another series of questions probed into family background, religious training, and formal education. Included in the list were such items as:

Was your family strict in religious matters?
Who was responsible for discipline?
To whom did you go when you were in trouble?
When did you finish high school?
Did your family discuss political and social questions?

One section of the interview was devoted to items which might indicate how the present environment and recent experiences of the subject were related to interest in the problem he had selected. Below are a few examples:

Has your salary been reduced within the past few years?
Do your friends agree with your point of view?

Have you made new friends because of interest in _____(the selected problem)?

The intellectual interests of the subject were investigated by asking questions regarding favorite books and magazines. Finally, there were included throughout the interview and questionnaire a series of items regarded as significant by psychiatrists and social psychologists, questions which sought to discover whether the individual was in opposition to most forms of authority or discipline, whether he was self-sufficient, whether he had either a very high or very low opinion of himself, etc.

The interview was given during the summer of 1932 to a group of teachers studying at a large Eastern university. Fifty-three volunteers were obtained from classes in social psychology and educational sociology. Two of the volunteers were rejected because they were not teachers; one volunteer failed to complete the interview.

In age, the group ranged from twenty-two to fifty-four. The teachers came from communities ranging in size from three hundred to six million. They came from twenty-one states, and the District of Columbia. The Middle West, the South, and the Middle Atlantic states were about equally represented. Ohio led the list, with eight representatives; New York had six.

The range of problems selected for discussion by the subjects ranged from that of one woman whose main citizenship interest was ousting an undesirable family from the residential district in which she lived to that of an active Socialist. The full list, with frequencies, is presented below:

Problem	Frequency
Abolition of Poverty	5
Maldistribution of Wealth	4
Equality of Opportunity for All	2
World Understanding	2
Advancing Socialist Party	1
Advancing Young Democrats	1
Aiding Adolescents	1
Improving Conditions for Children	1
Improving Methods of Farm Marketing	1
Segregation of Races	1
Better Political Economy	1
Slum Improvement	1
Farm Planning	1
Elimination of Race Prejudice	1
Improving Governmental Efficiency	1
Advancing Pacifism	1
Establishing a Little Theatre	1
Improving Religious Education	1
Abolishing Selfishness	1
Equal Opportunity for Negroes	1
The Effects of Motion Pictures	1
Advancing Parental Education	1
Teachers in Politics	1
Disseminating Sex Information	1
Spreading Adult Education	1
Fighting Anti-Semitism	1
Americanization of Foreigners	1
Security for Teachers	1
National Planning	1
Problems of Negroes	1
Unemployment	1
International Relations	1
Elimination of Unfairness, Injustice, and Intolerance	1
Spreading Vocational Education	1
Increasing the Influence of Women	1
Better Use of Leisure Time	1
Fighting Pay Cuts for Teachers	1
Race Relations	1
Economic Insecurity	1
Racketeering	1

Results:

As far as the general purpose of the study is concerned, the results may be presented in three ways: (1) as a series of case studies, (2) as a summary in the form of generalized patterns or "types", and (3) as statistical summaries. Examples of each will be given.

Let us examine briefly two case histories discovered by the interviews. It should be remembered that these cases are far from complete; an interview lasting two or three hours may well leave important facts concealed. The two case histories are selected merely because

they appear to be the most complete. They are presented neither as typical cases nor as evidence to bolster an hypothesis.

The first story is that of a young man, whom we shall call Ned, age twenty-five at the time of the interview. He was the youngest of two sons and was his mother's favorite. During his youth he was very religious; his family was conservative in politics and strict in religion and morals. Ned has managed to approach the opposite quality in all three fields. However, it is interesting to note that he declares he never has been free from his parents. His job took him away from home for ten months of the year, but apparently he soon fell into dependence upon his fiancée for advice. (About a year and half after the interview, Ned sent a letter announcing his marriage.) The influence of several well-known anti-religious books, added to the impact of compelling personalities met at college, led Ned to lose his faith in organized religion. However, because he does not wish to hurt his mother by confessing his liberal viewpoint in religious matters, he continues to go to church regularly when at home. He says that his intellectual and emotional life continued to be perturbed until he became a convert to Socialism; thereafter, he says he had more poise. Ned stresses with considerable emotional intensity that Socialism supplies a method for bringing about the "brotherhood of man." He has acted as leader of a Socialist Party local, the position being given him, as he believes, because he is an intellectual. (Ned regards intellectuals as inferior persons.) He is much worried about his "inferiority complex." Psychoanalysts would probably see great significance in the fact that Ned feels he has injured his older brother by becoming his mother's favorite. Psychoanalysts might also regard with suspicion the fact that Ned's poor health had been the direct cause for his being babied by his mother, and they would likewise stress the fact that at several critical points in his academic career he fell ill and had to go home.

The second case, that of Robert, appears as a human tragedy of frightful darkness. Robert selected dissemination of sex information as his most important social problem. He was born when his parents were both over forty years of age; neighbors told him he was an unwanted child. Both his parents worked; and his companions during childhood and youth were of rather low moral character. Robert earned his way through college by playing in a dance orchestra and again found himself in a group having low moral standards. After college, he married a woman whose intellectual and aesthetic attainments he regarded as superior to his own. Robert apparently made an unsuccessful attempt to compete with her, and finally fell back upon physical violence as the sole method of asserting his superiority. Needless to say, he has made a mess of marriage; at the time of the interviews his wife was suing for a divorce. Robert believes that his mother is responsible for alienating the affections of his wife; he also believes the two women are plotting against him in regard to money matters. All his woes are attributed by Robert to the hostile attitudes and actions of his parents, which he believes were due in turn to his being an unwanted child. He believes that widespread dissemination of marital advice will prevent such tragedies as his own.

Although such case histories may reveal the complex interplay of factors impinging upon a given personality and although information of value may be obtained about individual histories, scientists may well point out that there is no reason for believing such cases are frequent. Mere accumulation of case histories, however valuable the clues they yield, must be regarded as but one step towards understanding of the phenomena under scrutiny.

On a slightly more satisfactory plane, we come to the second method of classifying our results: "type analysis." Here, the results of the

interviews were examined to see if any clear-cut patterns emerged. Where a series of personal histories show many common features, it is possible that important causal factors may be discovered.

In this study of teachers as citizens, two patterns were displayed in sufficient number to warrant mention.

There were five cases in which the problem chosen for discussion soon showed itself to be mainly concerned with alleviating the poverty or suffering of the children taught by the teacher interviewed. In all cases the teacher was an unmarried woman over thirty years of age. None of the men, and none of the younger women displayed this type of interest. Although in two cases the teachers expressed a belief that our socio-economic system is ultimately to blame, nevertheless all teachers in this group sought to solve the problem solely by cooperation with charity or relief organizations. All acted on the assumption that by individual treatment of poor people poverty could be abolished. The hypothesis that this type of interest is associated with some factor or set of factors peculiar to unmarried women over thirty could be more fully tested by using a larger population in repeating the study.

The other discovered pattern was that of the development of criticism of the politico-economic system, the criticism usually exhibiting a bias toward acceptance of collectivist ideas. The teachers in this group were comparatively young; all were under thirty. Men and women were represented about equally. The interest apparently went through the following stages: all displayed an early interest in church groups and other religious organizations; the next stage was concern about war, accompanied by activity in pacifist movements; and the final stage was discussion of economic problems and espousal of mildly socialistic ideas, such as those represented in the early legislation of the New Deal. This pattern of development seems similar to that of certain religious organizations; in fact, some of the teachers concerned are working towards their ideals in groups under religious domination. In this case we find evidence of a broad social trend, the explanation of which is the task of trained sociologists.

The typological approach gives us some idea of patterns which may be widespread among teachers. However, unless a large and truly random sample is available, there is no way of knowing the relative importance of any one pattern. Besides, a larger sample, or one chosen differently, would probably bring to light additional "types." Because this method gives great freedom to the research worker's subjective judgment, it will be regarded with suspicion by scientists, who fear that individual biases and prejudices may lead each research worker to create types which lend support to a privately preferred hypothesis.

The typological approach in this instance may be defended by pointing out that it produces an integration of results which could be obtained by no other method available for this kind of study in the present state of the science. However, the results obtained must be regarded as tentative until the more objective methods are improved and modified sufficiently so as to test hypotheses produced by "type analysis."

The third level of interpretation may be called the statistical level. In the case of this exploratory study of teachers as citizens, statistical treatment loses much of its value for two reasons: (1) the method of choosing the sample, and (2) the small size of the sample population. There is reason to believe that teachers who attend the summer session of large Eastern universities are not representative of all teachers, that teachers who take courses in educational sociology or social psychology do not completely represent all students in attendance at the university, and that persons who answer a call for volunteers differ somewhat from those who fail to answer such a call. Moreover, considering the many

factors this study tried to take into consideration, a sample of fifty persons is too small. Standard deviations of various measures were so large that few statistical results achieved statistical significance.

However, this study can provide some idea of the type of data which might be unearthed by an investigation which studied a large number of teachers so chosen as to insure adequate representation of a clearly defined group of teachers. For example, in answer to the query, "Did your interest in this problem affect your conduct in the classroom?" twenty-seven teachers replied in the affirmative; nine answered, "Slightly"; eleven said, "No"; and three declared they were not certain.

Fourteen teachers felt they might be discharged if they engaged in greater activity in seeking to obtain solutions to the social problems they had named. What are the "dangerous" topics? Maldistribution of wealth received two mentions, as did equality of opportunity. The other topics, each of which was named once, were: forwarding the program of the Socialist Party, securing a better political economy, abolition of poverty, eliminating race prejudice, dissemination of sex information, obtaining greater security and recognition for teachers, combatting pay cuts for teachers, economic planning, international relationships, and race relations.

One of the variables studied in this research was the number of different types of activity each teacher engaged in because of interest in the selected social problem. To secure uniformity, a check list was used. For convenience, we shall speak of this measure as "activity."

There was a fairly high correlation between this measure of "activity" and the amount of time per week which teachers devoted to the activities; the Pearsonian r was .62, with a probable error of .06. Another statistically significant correlation was found between the activity of teachers and the activity of the organizations which they joined, also measured by the check list method. This correlation was .56, with a probable error of .11. Correlations between age and activity, and age of first interest in the problem and activity were both small, being .01 and .12, respectively.

Table I

VARIATION IN NUMBER OF ACTIVITIES CHECKED BY 50 TEACHERS

Activities	N	Mean	Standard Deviation
Joined organization because of interest			
Yes	19	11.26	2.48
No	31	5.66	2.98
Member of teachers' association			
Yes	38	7.36	3.79
No	12	9.00	3.98
Interest influenced classroom conduct			
Yes	27	8.70	3.80
"Slightly" or "No"	20	6.14	3.35
Popularity of viewpoint in community			
Majority viewpoint	26	6.56	3.60
Minority viewpoint	24	9.08	3.98

Table I (Continued)

Activities	N	Mean	Standard Deviation
Sex			
Male	11	9.09	2.94
Female	39	7.49	4.03
Religion			
Protestant	42	7.98	3.88
Catholic	4	6.50	3.04
Jewish	4	7.25	4.06
Size of Community			
Less than 2,000	4	8.50	3.35
2,000 to 5,000	2	8.00	4.00
5,000 to 10,000	8	6.50	2.60
10,000 to 50,000	8	8.75	4.24
50,000 to 100,000	8	10.00	3.08
100,000 to 500,000	11	6.09	4.03
500,000 to 1,000,000	3	8.00	3.56
More than 1,000,000	5	6.80	4.21
Possibility of anonymous action			
Yes	9	5.89	2.23
No	41	8.14	4.07
Attitude of School officials			
Approval	22	8.05	4.30
Indifference	10	7.00	3.38
Disapproval	12	8.58	3.80

Table I sets forth a sampling of the statistical data in regard to the "activity" variable. At this time we cannot furnish a comprehensive review of statistical results concerning all the variables included in the study.

Teachers who belong to organizations interested in social problems were found to be considerably more active than persons who act as individuals. However, the members of teachers' associations are slightly less active than nonmembers. (The difference is not statistically reliable.) Teachers who said their activities influenced classroom conduct were slightly more active than those who maintained their interests did not carry over. Here, again, the difference did not quite achieve statistical significance.

Members of minority groups were slightly more active than members of majority groups. Men were a little more active than women. The influence of religious doctrine appears to be small.

Size of community showed itself as not being a very important factor. This conclusion was supported by the finding that persons living in communities permitting of anonymous action were slightly less active than those who believed that their activities were sure to become known. This finding excites curiosity, especially when we recall that the most active teachers were those interested in problems which earned the hostility or distrust of the general public. On the other hand, the amount of activity appears to be associated neither positively nor negatively with the attitude of school officials. The fourteen teachers who felt there was danger of losing their jobs, nevertheless were more active than the average

for the group. Yet, nine of these teachers testified that they might have been more active if it were not for the school officials.

Summary

This report has presented some of the results obtained in an exploratory study of teachers as citizens. A pair of case histories were given, to show the complexity of the problem. A "type analysis" of the data revealed two patterns worth mentioning: (1) the unmarried woman teacher over thirty whose interest is in aiding individuals; and (2) the young person holding mildly socialistic ideals which have apparently been a development of religious interest.

Finally, a sample of the type of results to be expected from statistical manipulation of the data was set forth.

The exploratory study revealed that the study of teachers' citizenship activities presents so many complexities that the problem is beyond the scope of individually conducted research; what is needed is a broad, well-planned project involving the cooperation of many research workers.

EXTENSIVE READING VERSUS INTENSIVE TEXTBOOK STUDY AS A MEANS OF ACQUIRING A KNOWLEDGE OF SCIENTIFIC FACTS AND PRINCIPLES*

by
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During the economic depression, practically every item of expenditure in the public school program was under close scrutiny. The process of defending a recommended appropriation for magazines gave impetus to the question concerning their benefits in classroom teaching. The main problem finally resolved itself into the following divisions: (1) Will pupils acquire a greater number of facts from extensive reading than they may obtain from intensive textbook study? (2) What types of items will be read by the pupils who use scientific magazines? (3) What will be the resulting accumulation of facts and principles at the end of one, two, three, and four years of extensive reading? (4) Will the field of science under consideration have any appreciable effect upon the matter of obtaining facts and principles? (5) Will the type of instruction materially affect the results of extensive reading? (6) Would extensive reading assist the pupils to retain scientific facts and principles better than intensive textbook study procedures?

Some Studies of Similar Type

Probably the most comprehensive study concerning the value of extensive reading in science is that of Curtis.[1] He found that reading increases the range of articles to be read and increases the pupils' liking for science. Extensive reading in science also increases individual achievement in science and contributes to the scientific attitudes of the individual. Boys and girls possess different interests, both quantitative and qualitative, in scientific fields. Pupils given the proper encouragement and access to suitable books and magazines will read a very great amount of scientific literature for recreation along with their regular school work. He concludes that extensive reading is not employed to the extent justified by its value in the American secondary schools.

Crawford's[2] study in history shows that the pupils who read topics from current periodicals exceeded those who used only the textbook by highly significant differences. He cites as the advantages of the extensive reading method: (1) It is new and therefore deserves trial. (2) It emphasizes modern trends instead of ancient ones. (3) It gives the student out of school a contact with the present, (4) It emphasizes causes. (5) It captures the pupils' interest, and explains the past more clearly.

1. Curtis, F. D., Some Values Derived from Extensive Reading of General Science. Contributions to Education, No. 163, (New York, Teachers College, Columbia University, 1924).
2. Crawford, C. C., "An Experiment in Teaching History Backward", Historic Outlook, Vol. 22, No. 3, (Dec. 1931), pp. 395-397.

* This paper summarizes a dissertation offered in partial fulfillment of the degree of Doctor of Education at The Pennsylvania State College.

Coryell,[3] in studying the value of extensive reading in English literature, found that: (1) In all tests in the literature studied, the extensive reading classes did as well as the intensive reading classes. Extensive reading was thus as effective in training for comprehension as the intensive method. (2) The extensive reading method is just as good preparation for further reading on the part of the students as is the intensive method. (3) Extensive reading pupils are just as well prepared to meet school examinations. (4) Gains in appreciation are approximately equal for the two groups; and in addition, the extensive group covered six times as much as the intensive group. (5) Recitations of the extensive group were longer and of better quality. (6) The total vocabulary of the extensive group was greater than that of the intensive group. (7) There is more pupil activity in extensive reading and it is better liked by the pupils. (8) Extensive reading pupils find a deeper, wider, and more satisfying experience.

The results of Williams' study[4] differed from those of Coryell's experiment. Williams found that the differences between the two methods were not sufficiently great to justify the additional time spent by the extensive reading group.

Smith[5] states that a chief function of the teacher of literature is to establish the habit of lifelong association of good books, and that teachers in general are not prepared to direct an extensive reading program.

The Procedure of this Experiment

Approximately 2500 high-school pupils were used in the original set-up of this study. Of this number, however, only 1708 lent themselves to the matching technique as described later. These pupils were selected from three Pennsylvania high schools and were enrolled in general science, biology, physics and chemistry.

Sections were equated in I.Q.,[6] previous attainment in science,[7] grade in school, and sex. Home conditions, access to reading materials and libraries, extra curricular activities, and home duties were taken into consideration when possible to do so, or when such information was available. Arbitrary variations of three points in I.Q. or three percentiles in science achievement were allowed in matching pairs. Pairs of matched sections were instructed by the same teacher, thus partially eliminating teacher differences. Since this experiment includes all four of the secondary sciences, and since it was continued in School No. 2 for four years, some pupils participated for only one year, and others for two, three, and four years respectively.

Control sections received the type of instruction in current practice in the various schools. School No. 1 and School No. 3 are organized on the plan of daily recitation and School No.2 on a modified Morrison Plan.

Experimental sections received the same instruction as the control sections plus assignments, both general and specific, in reading scientific books, magazines, and other periodicals. The pupils had more or less freedom in the matter of selecting the sources of their outside reading. The school libraries were at their disposal and they were permitted to read any other materials which they might find in the fields of science. The pupils were encouraged to

3. Coryell, N. G., "An Evaluation of Extensive and Intensive Teaching of Literature", Contributions to Education No. 275, (New York, Teachers College, Columbia University, 1927).
4. Williams, R. R., "Extensive Reading Vs. Intensive Study of Literature", School Review, Vol. 37, pp. 666-678.
5. Smith, D. V., "Extensive Reading in Junior High School", English Journal, Vol. 19, pp. 449-462.
6. Determined in School No. 3 by the Otis Self-Administering Tests of Mental Ability, Intermediate and Advanced, and in the other schools by the Kuhlman-Anderson Intelligence Tests.
7. Determined by the science section of the Sones-Harry High School Achievement Test.

bring clippings of items of interest and present them for class discussions. In order to partly discourage mere use of scissors, the pupils were required to mark or to report by written comment the chief items of interest in the clippings as well as their scientific value. Records of readings and clippings were recorded and filed by a class "secretary." The materials thus compiled in notebook form were available at all times for perusal or study by the members of the experimental sections. Each experimental pupil was required to contribute a minimum of 125 items per year.

In all three schools, the materials for the courses were divided into units or subject phases. Pretests were given at the beginning of a unit or at the beginning of a monthly or a six weeks' examination period as prevalent in the schools. Final tests were given at the end of a unit or examination period.

Teacher-made tests were used in many instances due to the lack of published unit tests and due to the fact that many pupils received perfect scores in unit tests such as the Glenn-Welton Instructional Tests in Chemistry. In all teacher-made tests, reliability scores were determined by the split-halves technique. Validity was determined or confirmed by comparing and marking or checking the items with the Pennsylvania Course of Study,[8] with at least five different textbooks in each field, and with the objectives listed in the courses of study in the several schools. Chemistry tests in School No. 3 were also checked with Wray's list.[9] The tests were also submitted to a committee of five science teachers. All questionable items were then eliminated prior to administering the tests.

In addition to unit or periodical tests, "recall" or "delayed" tests were administered in School No. 2 at the beginning of the school term following the completion of each of the first three years of the experiment. The purpose of these tests was to determine the relative retention of the materials of the previous year. These tests consisted of 250 items each. Due to losses through graduation, pupil mortality, and the resultant destruction of the previous set-up of matched pairs, it was possible to administer these tests to only two of the original matched sections in biology and general science.

At the end of each year of the experiment comprehensive tests involving the magazine and periodical materials read were given to the participants of the experiment. These tests consisted of a battery arrangement of five hundred items each. These items included current science, recent discoveries or practical applications of scientific facts as described in the magazine articles. An effort was made to include only those items which were not included in the regular courses of study or in the textbooks in use.

Test data were treated by finding the means for each group of pretests, final scores, and gains. From this information, the differences in gains, the S.E. of the differences, and the ratio of the differences to their S.E. were determined. The formula recommended by Peters and Van Voorhis was used.[10]

$$S.E._{diff} = \frac{\sigma_{d's}}{\sqrt{N}}$$

where $\sigma_{d's}$ equals the standard deviation of the column of paired differences and N equals the number of pairs.

$$Ratio = \frac{Diff._{m^1-m^2}}{S.E._{diff.}}$$

8. Bulletin 73 and 74, Department of Public Instruction, Harrisburg, Pennsylvania.
9. Wray, R. P., The Relative Importance of Items of Chemical Information for General Education, Doctor's Dissertation, The Pennsylvania State College, 1932.
10. Peters, C. C. and Van Voorhis, W. R., Statistical Procedures and Their Mathematical Bases, (State College, Pa., The Pennsylvania State College, 1935).

As the tests used were of vastly different lengths and types, the reliabilities of the results found in each subject in each school as wholes were determined by a method other than the one involving test means. All experimental pupils in general science in School No. 2, for example, were combined into one large group and all control pupils in the same subject and school were combined in the same manner. The original matched pairs were maintained. The scores which each pupil made in the several tests were summed and a new set of scores was thus obtained. This procedure thus treats the separate tests in a subject as parts of one large battery test and all the pupils involved as two large matched sections. Computations were then made in the same manner as described for the treatment of the means. This procedure was followed for each subject in each school. Subject lines and school lines were kept intact due to pupil, test, course, and teacher differences.

As previously stated, the majority of the tests used were teacher made and were therefore not standardized. For this reason, when comparisons were desired in terms of percentages, the mean of the control group was considered as the norm for the test. Percentage differences were thus computed from this norm.

Decimal fractions are indicated in some of the tables of comparative test means. This is not as an indication of such exacting accuracy of measurements; but it enables the means of the totals, (or the totals of the mean pupils), to be considered as approximately the same whole number when computed from the means of the several tests or from the combined scores of all the pupils concerned.

The Findings of this Study

Due to lack of space, the results indicated in this article are presented in condensed or digest form.

The Type and Amount of Reading Done by the Pupils

As has been previously stated, the amount of reading performed by each experimental pupil as well as the clippings which he contributed were reported to and recorded by the class or section "secretary." Due to the vast differences in page sizes, a textbook page or a page from a medium-sized magazine such as Modern Mechanic and Inventions or Popular Mechanics was considered as a page. All other articles or clippings reported were weighted according to length, using the above-mentioned pages as units or bases of comparison.

As might be expected, some of the pupils read barely enough to cover the minimum assignments; while other pupils read very widely. One boy reported that he read seven supplementary texts in chemistry, plus the basic text. Another reported that he subscribed to and read regularly seven periodicals. The readings of the groups as wholes are indicated in Tables I and II.

The clippings from periodicals became very numerous. The author estimates that between 75,000 and 80,000 are in his possession at the end of four years' accumulation. Due to the enormous if not impossible task of accurately classifying the entire list, the author has classified only those which may be considered to be of chemical nature. There is no claim, however, that the topical headings or the clippings themselves do not overlap or include other fields of science. Table III will thus furnish an example of the nature of the items reported by the pupils of the classes studying chemistry. The topics were selected arbitrarily from those of the same titles in the various textbooks in the field. The items reported were those dealing with the chemical phases of the topics listed.

Table I

A COMPARISON OF THE MEANS OF THE NUMBER OF PAGES READ BY THE TWO GROUPS

Sections	Subject	Mean Number of Pages				
		Exten.	σ	Inten.	σ	Diff.
1-2	Chem.	3703	1501	1006	223	2697
A-A'	G.Sci.	4505	1872	1100	261	3405
B-B'	Biol.	2644	589	1038	401	1606
C-C'	Phys.	2082	1113	686	94	1396
D-D'	G.Sci.	2803	1219	626	99	2177
A-A'	Biol.	2334	959	866	92	1468
B-B'	Chem.	2962	1113	533	72	2429
E-E'	Gen.Sci.	2793	1201	1049	212	1744
D-D'	Biol.	2368	933	1390	614	978
A-A'	Phys.	2680	1078	1180	122	1500
F-F'	G.Sci.	2404	412	1304	422	1100
E-E'	Biol.	2060	318	900	249	1160
A-A'	Chem.	3725	1518	1378	111	2347
1-6	G.Sci.	2059	489	992	100	1067
7-12	Biol.	2460	567	925	17	1535
13-18	Phys.	1830	359	830	64	1000
19-22	Chem.	3510	765	1000	99	2510
Total		46922		16803		30119

It will thus be seen that the experimental pupils read on an average of from 978 to 3405 pages more than the control pupils. The extensive pupils read as a whole approximately 2.8 times as much as the intensive pupils. It will also be noticed that there is considerable difference among the several sections in the amount of reading. The means range from 1830 to 4505 in the extensive group and from 533 to 1390 in the intensive group.

During four years' participation in the experiment Section A students read 13244 (mean) pages, Section A' (intensive), 4524 pages, and the difference between the two amounted to 8720 pages. The intensive group thus read approximately one third as much as the extensive group.

The differences expressed in this table are evidently highly significant.

Table II

THE AVERAGES OF THE MEANS OF THE NUMBER OF PAGES READ PER SUBJECT FOR ALL SECTIONS IN ALL SCHOOLS

Subject	Number of Pages (Avg. of the Means)		
	Experimental	Control	Difference
General Science	2913	1014	1899
Biology	2373	1024	1349
Chemistry	3475	979	2496
Physics	2197	898	1299

It will be noticed that the greatest difference in the amount of reading between the two groups is in the field of chemistry. General science is second, with biology third and physics last. It will be seen that the experimental pupils read 2.87 times as much as the control pupils in general science, 2.31 times as much in biology, 3.55 times as much in chemistry and 2.44 times as much in physics.

Table III

TOPICAL DISTRIBUTION OF SOME OF THE CLIPPINGS REPORTED BY THE EXPERIMENTAL GROUP

School No.	Number of Clippings				
	1	2		3	Total
		Sec. Year	Fourth Year		
Topic:					
Manufacturing					
Iron and Steel	85	196	268	20	569
Coal and Coke	106	432	283	42	863
Coal By-products	341	543	764	34	1682
Textiles	203	408	892	78	1581
Fuels	443	106	76	23	648
Research	22	30	82	64	198
Bldg. Materials	300	421	784	15	1520
Elementary					
Lab. Processes	95	63	42	21	221
Elements	530	28	12	16	586
Problems	5	42	75	42	164
Biographical	108	65	275	78	526
Ceramics	391	983	1096	126	2596
Structural (Bldg.)	106	642	783	40	1571
Agri. Chem.	784	228	1543	142	2697
Foods					
Preparation	680	721	816	76	2293
Vitamines	415	816	714	84	2029
Preservation	403	202	128	93	826
Unclassified	1204	614	203	364	2385
Duplicates	340	423	75	30	868
Explosives	0	98	26	0	124
Adhesives	0	68	84	0	152
Equations	0	21	32	0	53
Organic Chemistry	0	936	1001	10	1997
Total	6561	8136	10054	1398	26149

It appears that the clippings reported were of general reference nature. The tendency was in favor of practical rather than theoretical items. Local glass plants and brick factories may have furnished the sources of interest or the reports of so many items in ceramics. The establishment of a department of Vocational Agriculture in School No. 2 seemed to influence the interest in items of Agricultural chemistry. Coal mines, stone quarries and building projects seem to have had their influences. Items listed under "Unclassified" consisted of popular items, headlines, and evidences of mere use of scissors without regard for the content of the clipping.

The Results of the Tests, Showing the Achievements of the Two Groups

As previously indicated, the results of the tests as shown in the following tables have been obtained by first obtaining and comparing the means of the tests individually in the paired sections, and then combining both the tests and the sections within subject and school limits. The reliabilities of the totals or wholes were determined from the combined groups of pupils and tests.

Table IV deals with the frequency with which individuals in one or the other group excelled their mates in the several groups without regard to the size of the differences. These measures are more or less general, but they indicate that the tendency is toward superiority of the extensive reading group. The table also shows that the pupils of the control group exceeded their mates in one third of the tests.

This study emphasizes gains rather than total final scores. The latter scores are usually indicated in the tables which follow for purposes of

Table IV

THE FREQUENCIES WITH WHICH THE EXPERIMENTAL PUPILS EXCEEDED THEIR MATES IN GAINS AND VICE VERSA, AND THE NUMBER OF TIMES THAT THE GAINS WERE EQUAL

(Plus Gains Favor the Experimental (Extensive) Group)

School	Sections	Subject	Frequencies (Gains)			
			Plus	Minus	Equal	Total Pairs
1	1-2	Chem.	634	768	128	1530
2	A-A'	G.Sci.	135	115	2	252
	B-B'	Biol.	202	220	10	432
	C-C'	Phys.	198	160	2	360
	D-D'	G.Sci.	285	43	15	343
	A-A'	Biol.	290	132	10	432
	B-B'	Chem.	253	247	40	540
	E-E'	Gen.Sci.	160	90	2	252
	D-D'	Biol.	395	188	5	588
	A-A'	Phys.	230	103	27	360
	F-F'	G.Sci.	240	12	0	252
	E-E'	Biol.	200	200	32	432
	A-A'	Chem.	502	35	3	540
3	1-6	G.Sci.	587	200	60	847
	7-12	Biol.	436	104	60	600
	13-18	Phys.	211	189	86	486
	19-22	Chem.	241	107	100	448
Total			5199	2913	582	8694

As will be noticed in the above table, the experimental pupils exceeded their mates in 5199 instances in a total of 8694, or 59.8 per cent of the total paired test scores. The control pupils exceeded their mates 2913 times or 33.5 per cent of the total and the two groups were equal 582 times or 6.7 per cent of the total.

comparison; but it is the gain over pretest which is more nearly indicative of the effect of our experimental conditions.

The comparative test achievements of the two groups in School No. 1 are shown in Tables V and VI. The pupils of School No. 1 were somewhat handicapped through lack of proper library facilities, both in the school and in the community in general. It will be shown that there is a marked difference in favor of the intensive group.

On account of lack of space, Table V is given only in part. There were fifty tests in this group, and the sampling shown in the table is indicative of the tendency of the gains to favor first one group and then the other. The significant feature is in the combination of the tests and pupils, showing that the whole is markedly in favor of the intensive or control group.

An important feature of this study is illustrated at this point. In this and in succeeding tables, it will be noticed that the tests have a

Table V

THE COMPARATIVE FINAL SCORES AND MEAN GAINS OF THE EXPERIMENTAL AND CONTROL GROUPS IN CHEMISTRY IN SCHOOL NO. 1

(Plus Differences Favor the Experimental Group.)

Test	Mean Final Scores		Mean Gains		Diff. Gains	S.E. Diff.	Ratio
	Ext.	Int.	Ext.	Int.			
1	23.9	26.2	12.8	15.8	- 3.0	1.00	3.00
2	31.3	28.7	13.4	12.1	1.3	1.29	1.00
3	25.4	22.8	16.2	18.3	- 2.1	0.92	2.28
4	21.4	21.3	14.2	17.4	- 3.2	1.13	2.85
10	63.2	63.7	44.9	51.4	- 6.5	2.64	3.55
11	30.8	33.4	25.7	29.2	- 3.5	1.73	2.02
35	26.4	25.7	24.9	23.8	1.1	1.27	0.86
36	68.9	65.6	61.5	58.5	3.0	1.97	1.52
37	29.8	24.2	29.8	24.2	5.6	1.02	5.40
38	76.5	74.6	76.5	74.6	1.9	2.04	0.93
39	76.7	80.6	76.7	80.6	- 3.9	1.82	2.14
46	37.6	37.5	37.6	37.5	0.1	0.43	0.23
47	77.8	85.3	77.8	85.3	- 7.5	3.21	2.43
50	78.8	87.0	78.8	87.0	- 8.2	1.47	5.57
Total	1990	2022	1804	1882	- 78	19.9	3.92

The extensive group exceeded the control group in sixteen tests; the intensive group exceeded in thirty-three tests; and the two groups were equal once in the total of fifty tests. The intensive group exceeded the extensive group by a mean of thirty-two points in mean final scores and by seventy-eight points in gains.

tendency to favor first one group and then the other. When tests and pupils are combined, however, the ratio of the whole is increased enormously above the ratios of the individual tests. This phenomenon is unusual and unexpected, but it is not statistically impossible. The underlying theory deals with the two formulae indicated in the procedure and the formula for the standard deviation of the sum of "a" sets of samples.[11] This latter formula is

$$\sigma_s = \sigma_i \sqrt{a - (a^2 - a)r_{iI}}$$

where σ_s represents the standard deviation of the sums, σ_i the standard deviation of one of the arrays, a the number of arrays and r_{iI} the intercorrelation between the arrays.

Table VI

DISTRIBUTIONS OF THE TOTAL GAINS OF THE PUPILS OF THE EXPERIMENTAL AND CONTROL GROUPS IN CHEMISTRY IN SCHOOL NO. 1

Scores (Gains)	Frequencies (No. Pupils)	
	Experimental	Control
2050-2099	0	2
2000-2049	2	0
1950-1999	0	6
1900-1949	4	1
1850-1899	2	12
1800-1849	10	4
1750-1799	4	4
1700-1749	4	0
1650-1699	4	1
Total No. Pupils	30	30

In School No. 1, each group consisted of only one section of thirty pupils. Each section showed superiority at times and in certain tests as indicated in Table V. When the results of the tests were grouped and the tests considered and treated as one large battery test, the total gains for the pupils showed the distributions as listed previously. The reliabilities of the differences as indicated in Table V ranged from 0.0 to 5.57. When the tests were combined, the results indicated a superiority in favor of the control group. The difference between the means is seen to be 78 and the Ratio is 3.92.

The means of the distributions previous, as computed from the ungrouped scores were found to be: Experimental, 1804 with a sigma of 93.7; Control, 1882 with a sigma of 88.6; Difference -78 with a sigma of 108.9. The S.E. of the Difference was found to be 19.9, thus giving a ratio of 3.92.

It has been shown that the Ratio is dependent upon the fraction composed of the difference between the means divided by the S.E. of the difference. The S.E. of the difference is in turn dependent upon the standard deviation of the column of paired differences divided by the square root of the number of pairs.

This study deals with the summation of the differential gains between the two groups in the experiment. Let us assume, for example, that the intercorrelation between "a" arrays of differential gains is very high, let us say 1. By substituting this value in our formula and performing the algebraic processes, the σ_s would become

$$\sigma_s = \sigma_i a$$

or "a" times the σ of the single arrays. In this case there would be no significant advantage in summing the differential gains.

Let us assume, however, that the intercorrelation between the arrays is very low, say at 0. Again substituting and performing the indicated processes, our formula becomes

$$\sigma_s = \sigma_i \sqrt{a}$$

The standard error of the differences would then be

11. Peters, C. C. and Van Voorhis, W. R., Statistical Procedures and Their Mathematical Bases, p. 174.

$$\frac{\sqrt{a}\,\sigma_{d's_1}}{\sqrt{N}}$$

or a much smaller fraction than would be the case with high intercorrelation.

Examination of our data, however, shows that the standard deviation of the sums does not conform to either of the above assumptions. If we assume further that the intercorrelation is negative, then our S.E. of the differences would become still smaller and enormously increase the ratio of the summed differences.

It would appear that the latter phenomenon has happened in this study. The differential gains seem to be negatively intercorrelated, thus showing an enormous advantage when the arrays are summed.

As previously stated, the two groups were matched on relatively highly correlated criteria. Our findings would then indicate that extensive reading procedures contained some factor which acted upon the pupils independently of the matching factors.

The reader is requested to bear this feature in mind when studying and interpreting the tables which follow, as it will be seen that the ratios are in general unexpectedly high.

School No. 2 offers a greater number of paired scores. The modified Morrison Plan in operation in this school requires a somewhat different approach to unit topics and probably more extensive reading. With these exceptions, however, the pupils in School No. 2 compare favorably with those in School No. 1.

Since the experiment was conducted in School No. 2 for four years, we have four pairs of matched sections in general science, three pairs in biology, and two pairs in each of the other subjects. Physics and chemistry were alternated in this school, hence the smaller number of paired sections.

The following tables show the results of the tests in this school. The totals indicated represent the scores obtained by averaging the scores of the totals of all pupils in the several subjects and sections. These total scores thus represent the means for all the pupils.

Distribution tables in this digest are not presented in graphic form with the exception of the one example. The reader may obtain a graph very easily by plotting these curves on cross-section paper, should there be a need for such presentation.

Table VII

A COMPARISON OF THE FINAL SCORES AND MEAN GAINS OF THE EXPERIMENTAL AND CONTROL SECTIONS IN GENERAL SCIENCE IN SCHOOL NO. 2

(Plus Differences Favor the Experimental Group.)

Test No.	Mean Final Scores		Mean Gains		Diff. Gains	S.E. Diff.	Ratio
	Exp.	Con.	Exp.	Con.			
			Sections A and A'				
51	72.1	61.8	72.1	61.8	10.3	2.36	4.36
52	81.3	87.2	81.3	87.2	- 5.9	2.31	2.55
53	81.1	77.9	81.1	77.9	3.2	2.38	1.34
54	133.2	113.6	133.2	113.6	19.6	6.10	3.21
55	69.0	77.1	69.0	77.1	- 8.1	3.10	2.61
56	87.3	89.4	87.3	89.4	- 2.1	3.67	0.57
57	120.8	112.1	120.8	112.1	8.7	3.51	2.48
			Sections D and D'				
51	70.3	64.9	70.1	67.6	2.5	1.10	2.27
52	89.2	88.4	87.2	86.4	0.8	0.61	1.31
53	80.3	79.6	80.3	79.6	0.7	0.91	0.77
54	135.1	128.4	133.2	113.7	19.5	6.00	3.25
55	80.3	84.4	76.2	80.7	- 4.5	1.49	3.02
56	90.8	84.2	88.3	81.1	7.2	2.20	3.27
57	124.6	120.8	124.6	120.8	3.8	2.90	1.31
			Sections E and E'				
51	72.8	65.4	70.3	64.7	5.6	1.88	2.98
52	84.3	86.2	80.1	82.4	- 2.3	1.43	1.61
53	90.4	80.3	84.6	74.7	9.9	3.06	3.24
54	136.4	140.3	128.4	128.4	0.0	4.05	0.00
55	78.3	72.4	77.1	69.0	8.1	6.10	1.33
56	84.3	85.3	83.3	84.3	- 1.0	1.35	0.74
57	128.6	125.4	120.8	112.1	8.7	3.71	2.35
			Sections F and F'				
51	71.4	64.8	71.4	61.5	9.9	3.06	3.24
52	83.6	83.1	83.6	83.0	0.6	1.36	0.44
53	91.3	82.4	89.4	82.4	7.0	3.21	2.18
54	132.3	131.4	131.1	120.8	10.3	3.80	2.70
55	79.4	72.6	76.4	70.3	6.1	2.45	2.50
56	85.3	84.6	83.8	80.3	3.5	1.76	1.99
57	130.4	126.6	127.4	115.1	12.3	4.10	3.00
Total	666	643	654	620	34	3.6	9.45

Here we notice the enormously increased ratio when tests and pupil scores are "summed." It will be noticed that the difference in favor of the Experimental Group is highly significant. This group was superior in all except seven tests and exceeded the control group from 3.00 to 4.37 per cent in total items known and from 4.15 to 8.10 per cent in gains.

Table VIII

A COMPARISON OF THE MEAN FINAL SCORES AND MEAN GAINS OF THE EXPERIMENTAL AND CONTROL SECTIONS IN BIOLOGY IN SCHOOL NO. 2

(Plus Differences Favor the Experimental Group.)

Test No.	Mean Final Scores		Mean Gains		Diff. Gains	S.E. Diff.	Ratio
	Exp.	Con.	Exp.	Con.			
			Sections A and A'				
58	115.1	105.5	110.5	104.5	6.0	2.56	2.34
59	92.7	82.2	59.3	53.1	6.2	3.21	1.93
60	75.3	66.0	42.0	38.4	3.6	1.83	1.97
61	84.4	77.0	45.6	46.2	- 0.6	3.33	0.18
62	98.1	86.0	81.0	76.8	4.2	3.36	1.25
63	68.2	58.5	31.2	28.1	3.1	2.16	1.43
64	87.0	77.6	87.0	77.6	9.4	3.85	2.44
65	116.1	91.1	98.6	92.4	6.2	3.68	1.68
66	99.5	80.0	73.8	57.3	16.5	5.01	3.29
67	70.0	53.0	61.1	43.2	17.9	3.23	5.54
68	47.9	50.4	39.8	39.9	- 0.1	2.67	0.04
69	129.0	111.6	129.0	111.6	17.4	4.30	4.05
			Sections B and B'				
58	110.2	108.1	102.4	102.1	0.3	0.36	0.83
59	94.2	93.1	64.8	65.9	- 1.1	0.40	2.75
60	75.4	76.2	64.3	66.5	- 2.2	2.35	0.94
61	82.6	89.8	80.1	84.6	- 4.5	2.03	2.22
62	100.3	108.1	98.2	98.2	0.0	0.23	0.00
63	76.2	70.1	70.2	65.2	5.0	2.26	2.21
64	90.2	91.4	86.1	84.1	2.0	1.71	1.17
65	115.1	120.3	110.2	118.1	- 7.9	3.06	2.58
66	103.2	102.4	90.3	89.1	1.2	4.01	0.30
67	74.1	73.1	68.4	68.8	- 0.4	0.60	0.67
68	49.3	50.1	36.3	34.2	2.1	1.46	1.44
69	138.4	134.8	130.6	112.4	18.2	3.90	4.67
Total	1095	1050	966	907	59	4.82	12.2

Due to lack of space, Sections D, D', E and E' are not listed in detail in this table. The sample scores given are indicative of the whole groups in the matters of the gains favoring first one then the other group, the variability of the differences and ratios of individual tests, and the high ratio obtained by combining pupils' scores and tests. It will be noticed that the experimental group exceeded the control group by 45 points in total items known and by 59 points in gains. The differences in gains are highly significant as shown by the ratio of 12.2.

Table IX

A COMPARISON OF THE MEAN FINAL SCORES AND MEAN GAINS OF THE EXPERIMENTAL AND CONTROL SECTIONS IN PHYSICS IN SCHOOL NO. 2

(Plus Differences Favor the Experimental Group.)

Test No.	Mean Final Scores		Mean Gains		Diff. Gains	S.E. Diff.	Ratio
	Exp.	Con.	Exp.	Con.			
			Sections A and A'				
70	140.7	126.7	132.1	117.6	14.5	4.60	3.15
71	76.3	64.3	69.6	58.0	11.6	3.10	3.74
72	83.9	61.2	75.7	56.8	18.9	3.86	4.90
73	387.2	354.0	353.0	322.2	30.8	10.86	2.84
74	212.8	183.7	200.1	179.3	20.8	7.00	2.97
75	241.2	204.6	223.2	184.8	38.4	11.76	3.27
76	269.0	261.8	261.6	224.7	36.9	7.46	4.95
77	994.9	980.7	957.7	931.5	26.2	15.13	1.73
78	79.2	80.0	79.2	80.0	- 0.8	4.05	0.20
79	389.5	318.6	331.3	264.1	67.2	14.35	4.68
			Sections C and C'				
70	135.4	134.3	128.6	129.8	- 1.2	4.05	0.30
71	78.2	73.4	74.3	70.3	4.0	3.26	1.23
72	64.2	60.1	58.2	54.1	4.1	3.43	1.20
73	360.2	361.3	321.0	328.6	- 7.6	9.46	0.80
74	200.2	180.3	188.4	180.3	8.1	6.10	1.33
75	200.4	206.8	190.3	200.6	-10.3	10.73	0.96
76	276.3	265.4	260.1	260.3	- 0.2	4.05	0.05
77	906.4	910.8	904.2	887.5	17.7	13.13	1.35
78	75.4	76.4	75.4	76.4	- 1.0	3.38	0.30
79	316.2	324.4	312.4	320.4	8.0	12.70	0.63
Total	2744	2615	2599	2464	135	18.60	7.30

The difference between the two pairs of sections is very prominent. This may be due to the fact that Sections A and A' had three years' experience in the experiment at the conclusion of this series of tests. It will be noticed that the control group exceeded the experimental group only once in the first pair of sections, but exceeded in half the tests in the second pair of sections.

The difference in gains of 135 points is in favor of the experimental groups; and the ratio of 7.3 indicates that this difference is highly significant.

Table X

A COMPARISON OF THE MEAN FINAL SCORES AND MEAN GAINS OF THE EXPERIMENTAL AND CONTROL SECTIONS IN CHEMISTRY IN SCHOOL NO. 2

(Plus Differences Favor the Experimental Group.)

Test No.	Mean Final Scores		Mean Gains		Diff. Gains	S.E. Diff.	Ratio
	Exp.	Con.	Exp.	Con.			
			Sections A and A'				
80	83.9	80.0	82.1	78.1	4.0	2.86	1.40
81	56.0	40.7	55.4	40.0	15.4	3.02	5.10
82	89.4	70.3	89.4	70.3	19.1	4.83	3.95
83	78.0	70.2	76.2	65.1	11.1	4.91	2.26
84	143.4	115.2	141.6	108.2	33.4	5.00	6.68
85	125.0	75.0	124.5	72.0	52.5	4.61	11.39
86	71.3	52.8	70.0	52.4	17.6	2.67	6.59
87	40.1	30.1	38.3	27.6	10.7	1.35	7.93
88	56.0	35.0	55.6	33.6	22.0	2.85	7.72
89	80.1	55.4	79.1	55.3	23.8	4.31	5.52
90	94.0	69.0	93.8	68.8	25.0	2.07	12.08
91	95.2	83.8	93.8	82.6	11.2	1.57	7.13
92	112.0	111.9	110.9	110.9	0.0	5.00	0.00
93	510.2	401.1	505.0	380.0	125.0	14.56	8.59
94	240.3	235.6	236.4	231.3	5.1	2.55	2.00
			Sections B and B'				
80	78.4	76.3	74.4	74.3	0.1	2.06	0.05
81	50.2	50.4	48.6	48.6	0.0	2.86	0.00
82	80.3	80.4	78.1	74.1	4.0	3.33	1.20
83	76.2	74.1	68.3	70.2	- 1.9	3.53	0.54
84	126.3	128.2	110.4	116.4	- 6.0	3.70	1.62
85	74.3	73.8	74.1	70.1	4.0	4.05	0.99
86	64.2	67.1	62.3	64.3	- 2.0	1.55	1.29
87	36.2	37.1	35.1	35.1	0.0	1.20	0.00
88	42.6	41.4	32.4	30.3	2.1	2.35	0.89
89	68.2	69.3	51.2	51.6	- 0.4	2.71	0.15
90	70.1	68.2	52.3	50.1	2.2	2.10	1.05
91	80.1	80.3	76.4	75.4	1.0	1.36	0.74
92	108.2	110.3	102.4	98.4	4.0	4.10	0.98
93	421.4	415.6	364.2	375.4	-11.2	10.70	1.05
94	210.4	216.8	200.2	210.4	-10.2	7.10	1.44
Total	1731	1558	1641	1461	180	24	7.5

Table X furnishes another example of the superiority of the experimental groups over the control groups. It will be noticed in the mature sections, (A and A'), that the differences are highly significant as shown by the high ratios; while in the other sections, the differences are low and favor both groups in the series of tests.

The experimental group exceeds by 173 points in total items and by 180 points in gains. This difference is shown to be highly significant.

Table XI

DISTRIBUTIONS OF THE TOTAL GAINS OF THE PUPILS OF THE EXPERIMENTAL AND CONTROL SECTIONS IN THE SEVERAL SUBJECTS IN SCHOOL NO. 2

Scores (Gains)	Frequencies (No. Pupils)	
	Experimental	Control
	General Science	
750-774	1	0
725-749	3	0
700-724	2	4
675-699	30	6
650-674	54	17
625-649	48	55
600-624	11	31
575-599	6	29
550-574	2	4
525-549	0	3
500-524	0	8
Total Pupils	157	157
	Biology	
1200-1249	1	0
1150-1199	7	1
1100-1149	1	1
1050-1099	25	7
1000-1049	25	29
950-999	39	29
900-949	23	7
850-899	23	43
800-849	11	5
750-799	2	28
700-749	0	7
Total Pupils	157	157
	Physics	
2850-2899	3	0
2800-2849	0	0
2750-2799	3	0
2700-2749	1	3
2650-2699	19	2
2600-2649	22	4
2550-2599	2	2
2500-2549	6	10
2450-2499	4	14
2400-2449	7	17
2350-2399	3	14
2300-2349	0	3

Table XI (Cont'd.)

Scores (Gains)	Frequencies (No. Pupils)	
	Experimental	Control
2250-2299	2	1
2200-2249	0	2
Total Pupils	72	72
	Chemistry	
2050-2099	1	0
2000-2049	1	0
1950-1999	2	0
1900-1949	4	0
1850-1899	13	0
1800-1849	5	0
1750-1799	8	0
1700-1749	0	0
1650-1699	3	2
1600-1649	5	6
1550-1599	1	6
1500-1549	3	16
1450-1499	6	9
1400-1449	6	12
1350-1399	6	9
1300-1349	1	5
1250-1299	2	2
1200-1249	2	4
1150-1199	3	1
Total Pupils	72	72

The means, differences, standard errors, and ratios are indicated in the preceding tables and are not repeated in this table of distributions. It will be noticed that the Ratios are all exceptionally high and are in favor of the experimental or extensive reading groups. It is thus indicated that extensive reading procedures are superior to intensive study in School No. 2.

Tables VII to XI will thus show that the experimental or extensive reading groups in School No. 2 showed marked superiority over the intensive study groups. An interesting feature was the intense rivalry which existed between Section A and Section A'. This rivalry increased with the maturity of the experiment and may have had some effect upon the achievements of the pupils in Section A.

It has been previously mentioned that tests covering the magazine articles were given in School No. 2. These tests consisted of items which appeared in the magazines but were not included in the texts which were in use at the time of the tests. As further stated, these items constituted materials additional to the regular courses of study. These tests were given to 386 matched pairs of pupils. On account of the similarity of the tests, both in length and type, the results are reported in a form which combines the results for all the pupils involved.

Table XII

THE DISTRIBUTIONS OF THE SCORES OF TESTS DEALING WITH MAGAZINE ARTICLES AS ATTAINED BY 386 PUPIL-PAIRS OF THE EXPERIMENTAL AND CONTROL GROUPS IN SCHOOL NO. 2

Scores	Frequencies (No.Pupils)	
	Experimental	Control
450-499	16	0
400-449	30	0
350-399	50	0
300-349	76	0
250-299	103	0
200-249	75	10
150-199	21	75
100-149	15	99
50-99	0	115
0-49	0	87
Total No. Pupils	386	386

Means of the Distributions

Group	Mean	Sigma
Experimental	297	81.4
Control	100	55.7
Difference	197	98.6
S.E. Diff.	5.02	
Ratio	39.24	

It will be noticed that the difference between the means is 197 points with the extreme ratio of 39.24.

The range of the scores was from 111 to 485 in the experimental group and from 20 to 204 in the control group. The relative amount of overlapping may be seen more clearly in the graphs of these distributions shown immediately following this distribution table. It is obvious that the experimental group is considerably in advance of the control group in the matter of test attainment.

Means, differences and sigmas were computed from the columns of ungrouped scores.

It has also been mentioned that the experimental groups were encouraged to read magazines. On the other hand, the control groups were not forbidden to read them; and we find that some individuals in these groups read considerably.

The distributions of the scores of the two paired groups are shown in Table XII. It will be noticed that the experimental pupils showed a knowledge of 297 (mean) items in comparison to the mean of 100 items of the control group. The difference of 197 items, and the enormous ratio of 39.24 show these results to be significantly in favor of the experimental group. Further examination of the graph (Figure I) will reveal that the two curves are similar in shape. It will also be noticed that the two curves are almost wholly separated, and that the two means are a considerable distance apart.

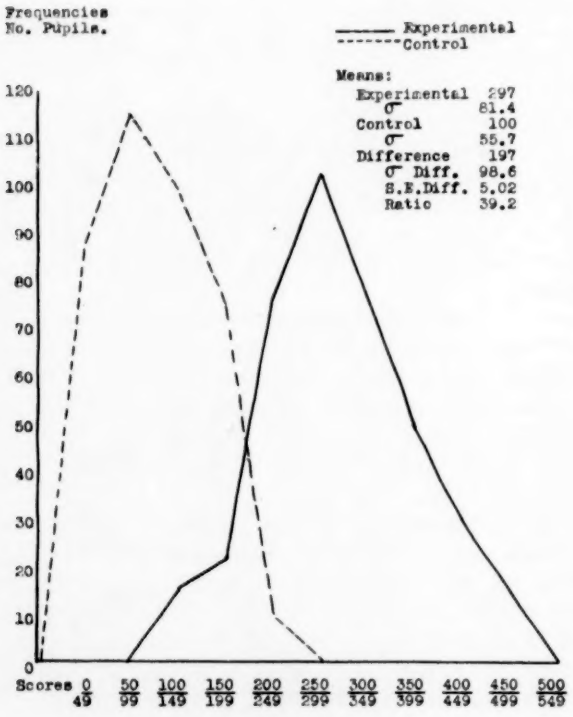
We thus see that, in addition to the superiority of the experimental group in the tests involving "standard" items of the course of study, experimental pupils possess a knowledge of almost 200 items more than the control pupils.

The author was not intimately acquainted with the progress of the study in School No. 3. Most of the results of the tests, paired pupils, amount of reading and other relevant materials were reported in tabular form without comment. In many cases, initials were used instead of the names of the pupils so that the sex of the pupils was not indicated.

The reports indicated that three pairs of sections were equated in general science, and were indicated as

Figure I

THE DISTRIBUTIONS OF THE SCORES OF TESTS DEALING WITH MAGAZINE ARTICLES AS ATTAINED BY 386 PUPIL-PAIRS OF THE EXPERIMENTAL AND CONTROL GROUPS IN SCHOOL NO. 2



Sections 1, 2, and 3 matched or equated with 4, 5, and 6, the latter three designated as the control group. Similarly in biology, Sections 7, 8, and 9 were equated with 10, 11, and 12; in physics, Sections 13, 14, and 15 with 16, 17 and 18; and in chemistry, Sections 19 and 20 with 21 and 22. These paired sections or groups aggregated 121 pairs in general science, 100 pairs in biology, 81 pairs in physics and 64 pairs in chemistry.

Seven tests were given in general science, six in biology, six in physics and seven in chemistry. The numbers of the tests were arbitrarily assigned by the author.

Table XIII summarizes the means of the test results in the several subjects in School No. 3. Table XIV shows the distributions of the gains in these subjects.

An examination of Table XIII will reveal that the experimental group exceeded the control group in total final scores in general science by a mean of 49 points or 4.9 per cent, and in gains by 80 points or 8.7 per cent. The exceptionally high ratio of 16.7 shows that the differences are highly significant.

The experimental pupils in biology exceeded their mates by 47 points or 4.9 per cent in total final scores, and by 66 points or 7.2 per cent in gains. The ratio of 10.6 shows that these differences in gains are highly significant.

Reference to Table XIII will show that the difference between the two groups is less pronounced in physics than in any of the other subjects in School No. 3. The differences are in favor of the experimental group by 68 points or 6.6 per cent in total final scores and by 47 points or 4.7 per cent in gains. The Ratio of 4.17 indicates that the latter difference is significant.

The experimental pupils in chemistry exceeded their mates by 86 points or 8.1 per cent in total final scores and by 83 points or 8.0 per cent in gains. The Ratio of 7.94 indicates that the difference in gains is significant.

Distributions of the total gains of the pupils in the several subjects in School No. 3 are shown in Table XIV. The means, differences and ratios are indicated in Table XIII and are not repeated. As the data of the two tables are practically the same, no further comment appears necessary concerning Table XIV.

In summarizing the comparative achievement of the two groups in School No. 3, we find the following:

1. The experimental group exceeded the control group in total final scores in all subjects as shown in Table XIII.

2. The experimental group exceeded the control group in gains in all subjects.

Table XIII

THE COMPARATIVE MEAN FINAL SCORES AND MEAN GAINS OF THE EXPERIMENTAL AND CONTROL GROUPS IN THE SEVERAL SUBJECTS IN SCHOOL NO. 3

Test No.	Mean Final Scores		Mean Gains		Diff. Gains	S.E. Diff.	Ratio
	Exp.	Con.	Exp.	Con.			
			General Science				
95	57.5	60.5	54.5	56.5	- 2.0	1.90	1.05
96	93.6	95.4	95.5	88.0	7.5	3.0	2.50
97	196.3	185.4	195.7	180.2	15.5	3.17	4.90
98	86.4	70.2	78.8	69.2	9.6	5.21	1.85
99	106.8	110.4	100.0	107.5	- 7.5	3.06	2.45
100	199.6	174.3	191.8	168.3	23.5	5.04	4.65
101	304.6	302.5	280.0	246.6	33.4	8.32	4.00
Tot.	1048	999	996	916	80	4.8	16.7
			Biology				
102	32.4	31.3	30.6	28.6	2.0	1.00	2.00
103	124.3	114.6	120.8	113.8	7.0	4.00	1.75
104	124.5	146.2	100.0	118.6	-18.6	6.30	3.05
105	134.3	128.3	124.3	106.0	18.3	4.80	3.75
106	306.4	278.3	300.3	274.5	25.8	5.40	4.75
107	300.2	275.8	299.7	268.4	31.3	6.80	4.60
Tot.	1022	975	976	910	66	6.21	10.6
			Physics				
108	188.5	190.3	179.0	186.4	- 7.4	2.8	2.65
109	170.1	173.4	154.0	162.0	- 8.0	4.6	1.75
110	150.6	134.2	141.0	124.1	16.9	5.2	3.25
111	96.4	104.2	90.7	103.4	-12.7	4.3	2.95
112	200.1	175.6	190.0	168.4	22.5	7.5	3.00
113	290.6	250.3	280.0	245.1	34.9	8.4	4.15
Tot.	1096	1028	1036	989	47	11.26	4.17
			Chemistry				
114	120.6	128.4	117.4	124.5	- 7.1	3.0	2.35
115	115.2	120.3	113.0	118.6	- 5.6	3.8	1.45
116	154.1	130.5	148.2	128.4	19.8	4.8	4.12
117	140.6	145.2	138.0	143.9	- 5.9	7.8	0.75
118	190.8	160.8	186.9	154.3	32.6	4.1	7.95
119	160.3	134.5	156.3	128.4	27.9	7.5	3.75
120	275.4	250.8	267.6	246.3	21.3	9.9	2.15
Tot.	1157	1071	1127	1044	83	10.5	7.94

The test results as shown above were reported with the several sections combined into larger groups according to subject. It was thus necessary to further combine only the tests to determine the reliability measures.

The sections participating in School No. 3 were reported only by number and with matched pupils, but the identity of any section was lost in the ungrouped columns of test scores.

It will be seen that the control group was superior to the experimental group in two of the general science tests. Three of the ratios are high in these tests and the others are relatively low. When the tests were combined, however, the difference of 80 points in favor of the experimental group was found to be highly significant. The experimental group excelled by 49 points in total items known.

In the cases of the biology tests, the control group exceeded the experimental group but once. The ratios are seen to range from 1.75 to 4.75. The combined groups showed a difference of 66 points in favor of the experimental group and a Ratio of 10.6. It will also be seen that in both general science and biology the difference between the total mean final scores was less than the difference between the means of the gains.

The control group showed superiority in three of the six physics tests. The ratios are seen to vary from 1.75 to 4.15 in the separate tests. In the combined tests the difference of 47 points is in favor of the experimental group. The Ratio is 4.17 and shows this difference to be significant.

In the chemistry tests, the differences range from -7.1 to 32.6 and the Ratios vary from 0.75 to 7.95. The control group is superior in three of the seven tests. The difference in gains (total) of 83 is shown to be significantly in favor of the experimental group by the ratio of 7.94.

3. The differences in gains between the two groups were statistically significant in all subjects.

4. It is thus proved in School No. 3 that extensive reading has been an effective means of acquiring a knowledge of scientific facts.

Table XIV

DISTRIBUTIONS OF THE TOTAL GAINS OF THE PUPILS OF THE EXPERIMENTAL AND CONTROL SECTIONS IN THE SEVERAL SUBJECTS IN SCHOOL NO. 3

Scores (Gains)	Frequencies (No. Pupils)	
	Experimental	Control
	General Science	
1150-1199	4	0
1100-1149	7	0
1050-1099	24	4
1000-1049	17	17
950-999	33	25
900-949	25	30
850-899	4	15
800-849	3	21
750-799	4	5
700-749	0	4
Total No. Pupils	121	121
	Biology	
1100-1149	0	2
1050-1099	3	0
1000-1049	18	3
950-999	61	5
900-949	18	64
850-899	0	21
800-849	0	5
Total No. Pupils	100	100

Table XIV (Cont'd.)

Scores (Gains)	Frequencies (No. Pupils)	
	Experimental	Control
	Physics	
1150-1199	0	2
1100-1149	11	5
1050-1099	14	16
1000-1049	42	13
950-999	7	14
900-949	7	17
850-899	0	10
800-849	0	1
750-799	0	3
Total No. Pupils	81	81
	Chemistry	
1150-1199	11	2
1100-1149	45	2
1050-1099	2	26
1000-1049	1	21
950-999	4	6
900-949	1	5
850-899	0	2
Total No. Pupils	64	64

The foregoing tables have dealt with the comparative results of the tests given during the term. As previously mentioned, items were selected at random from the tests given during the previous years in general science and biology; then these items were compiled in test form and administered at the beginning of the following school terms. Physics and chemistry pupils were not available for the tests of this type. Table XV shows the comparative means of the two groups in these "recall" tests.

Table XV

A COMPARISON OF THE MEANS OF THE EXPERIMENTAL AND CONTROL GROUPS IN THE RECALL TESTS

(Plus Differences Favor the Experimental Group.)

Test No.	Subject	Mean Scores		Diff.	S.E. Diff.	Ratio
		Exper.	Control			
124	Gen. Sci.	243	204	39	6.1	6.4
125	Gen. Sci.	215	219	- 4	7.1	0.56
126	Biol.	202	176	24	5.1	4.70
127	Biol.	218	142	76	9.1	8.35

Table XV thus shows that with one exception, the experimental group was significantly superior in the recall of test items.

While it is shown that the control group excelled the experimental group in one of the tests, an average of the four would seem to indicate that the whole was in favor of the experimental group. Extensive reading is thus shown to be an effective means of increasing the recall of test items.

The question of sex differences in attainment has been one of the related problems of this study. During the progress of the study, the author was interested to note the rivalry which existed between the two sexes in the matter of achievement. In the original matching procedures of this study, boys were matched with boys and girls with girls. There was evidence of some difference between the two sexes in the scores shown by the Sones-Harry Test. There was also some difference in the preference for different types of magazines and other periodicals by the boys. Before the experiment was well under way, the boys indicated that they preferred adventure stories and the girls indicated that their preferences were romances and magazines dealing with movie and radio stars. As the conditions of the study required considerable reading of periodicals with scientific content, there seemed to arise a common interest in this type of publication.

Motivations responsible for the rivalries may have been similar to those found by Maller.[12] Speed, self-interest, cooperation or the lack of it, sharing work, etc., may have had their influences; but whatever factors were present seem to have caused additional effort on the part of both groups.

A comparison of the total final achievement in test scores showed that it would be difficult to match members of opposite sexes in the matter of achievement as shown by the Sones-Harry Test. It was necessary to match the two sexes in the matters of I.Q., rank in former science achievement and grade in school. Data from Schools No. 1 and No. 3 were not available in this form or segregated as to sex. The comparisons were thus limited to some of the pupils of School No. 2. There were 125 pairs of pupils in general science, the same number in biology, and only 64 pairs in each of the other subjects. Others were omitted on account of the change in matching procedures.

Table XVI shows the distributions of the total final scores of the pupils in the several subjects. There is the possibility that in these distributions the groups have been reduced to

12. Maller, J. B., Cooperation and Competition, Contributions to Education, No. 384, (New York, Teachers College, Columbia University, 1929).

include only a few whose scores might not be indicative of a random group. In other words, there may have been an over-selection since the pupils remaining in these distributions comprise only a "part of a part" of those originally in the study.

Further examination of Table XVI will show that the boys exceeded the girls in general science and physics, but that the sexes were practically equal in biology and chemistry. There is a possibility that the girls worked harder due to the existing rivalry between the sexes. Then too, there may have been sufficient physics items in the general science tests to have caused the similarity in the respective differences. On the other hand, as previously mentioned, the groups may have been too select to show valid comparisons.

These results compare rather favorably with the means of the total final scores of all the boys and all the girls in the several subjects without considering matched pairs. As is shown in Table XVII, the numbers of boys and girls in the several subjects were not the same, neither were they paired in computing the results as shown in the table.

Table XVI

THE DISTRIBUTIONS OF THE TOTAL FINAL SCORES OF THE BOYS AND GIRLS IN THE SEVERAL SUBJECTS IN SCHOOL NO. 2

Total Final Scores	Frequencies (No.Pupils)	
	Boys	Girls
	General Science	
800-849	3	0
750-799	13	2
700-749	20	14
650-699	62	22
600-649	20	60
550-599	3	15
500-549	2	5
450-499	2	5
400-449	0	2
Total Pupils	125	125

Total Final Scores — Frequencies

Means of the Distributions

Group	Mean	Sigma
Boys	677	60.2
Girls	627	64.4
Difference	50	88.2
S.E.Diff.	7.88	
Ratio	6.34	

Biology

Scores	Boys	Girls
1200-1249	1	1
1150-1199	1	2
1100-1149	7	6
1050-1099	18	17
1000-1049	65	60
950-999	22	26
900-949	8	11
850-899	2	2
800-849	1	0
Total Pupils	125	125

Means of the Distributions

Group	Mean	Sigma
Boys	1021	56.6
Girls	1019	57.2
Difference	2	60.4
S.E. Diff.	7.2	
Ratio	0.27	

	Boys	Girls
	Physics	
2800-2899	2	0
2700-2799	5	1
2600-2699	11	6
2500-2599	21	10
2400-2499	11	22
2300-2399	6	11
2200-2299	4	8
2100-2199	4	6
Total Pupils	64	64

Means of the Distributions

Group	Mean	Sigma
Boys	2513	173.5
Girls	2417	162.2
Difference	96	237.4
S.E. Diff.	29.7	
Ratio	3.2	

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Total Final Scores — Chemistry — Frequencies

Scores	Boys	Girls
1900-1999	3	3
1800-1899	4	3
1700-1799	14	13
1600-1699	28	29
1500-1599	10	11
1400-1499	3	4
1300-1399	2	1
Total Pupils	64	64

Means of the Distributions

Group	Mean	Sigma
Boys	1664	122.1
Girls	1658	114.9
Difference	6	134.7
S.E. Diff.	16.85	
Ratio	0.35	

Table XVI reveals that the only significant differences are in the fields of general science and physics. In biology and chemistry, the differences are very small and insignificant. Graphs of these distributions are markedly similar within subject fields.

the biology and chemistry tests. The presence or absence of some factor seems self-evident in these apparent discrepancies.

Our final comparison of test achievements is that of the cumulative effect of several years' participation in the experiment. Sections A and A' in School No. 2 were the only pupils who participated in the experiment for four years. Other sections had two years' participation. Table XVIII shows the effect of maturity upon the relative degrees of differences in gains of the pupils who participated in the study for more than one year.

The reliabilities of the differences shown in Table XVIII have been indicated in the previous tables. There is thus a trend toward an increase in the rate of gains and the differences between the gains of the two sections with the increasing maturity of the pupils in the study.

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Table XVII

THE COMPARATIVE TOTAL FINAL SCORES OF ALL BOYS AND GIRLS IN THE SEVERAL SUBJECTS IN SCHOOL NO. 2

Subject	No. Pupils			Mean Total Final Scores				
	Boys	Girls	Total	Boys	Sigma	Girls	Sigma	Diff.
G. Sci.	166	148	314	700	123	570	110	130
Biol.	170	144	314	2080	247	2070	254	10
Phys.	80	64	144	2520	275	2417	162	103
Chem.	72	72	144	1651	125	1638	120	13

Table XVII parallels Table XV in the findings concerned with sex differences in achievement. It will be noticed that the boys exceed the girls in general science and physics. From the previous results, we have reason to believe that these differences are significant. On the other hand, we see that the differences in biology and chemistry are only slight and are apparently not significant.

There was evidence during the matching procedures involving the boys and girls that those who were discarded may have influenced the means of the groups as a whole. It is certain that the differences evident in the Sones-Harry Test results were not apparent in

Some Pupil Opinions

Although this study has not attempted to measure the opinions of the pupils participating in the experiment, an impromptu questioning of some of the sectional classes brought to light the

Table XVIII

THE EFFECT OF MATURITY UPON GAINS AS SHOWN BY THE DIFFERENCES IN GAINS OF THE PUPILS WHO PARTICIPATED IN THE EXPERIMENT FOR MORE THAN ONE YEAR

Years	Subject	Sections	Per cent Difference in Gains of the Experimental Group Above the Control Group
1	G. Sci.	A-A'	4.15
2	Biol.	A-A'	11.68
3	Phys.	A-A'	10.93
4	Chem.	A-A'	25.46
1	G. Sci.	D-D'	4.76
2	Biol.	D-D'	9.75
1	G. Sci.	E-E'	4.71
2	Biol.	E-E'	3.69
1	Biol.	B-B'	1.28
2	Chem.	B-B'	-0.99

As previously mentioned, since the majority of the tests were not standardized, the achievement of the control group was considered as the norm. From this achievement the percentage differences were computed.

An increase in the extent of the differences will be noted in the case of Sections A and A' and D and D' as the pupils become more mature. In the other sections, a decrease is noticed. As the latter pupils participated only two years, their further reactions under the conditions of the experiment are a matter of conjecture.

following opinions: (1) Many pupils preferred the freedom which was allowed them in extensive reading to the "assigned labor" of the textbook. (2) Many textbook articles were supplemented in periodicals by practical applications to everyday life. (3) There seems to be a certain vividness, impressiveness, or some other factor which makes the item easier to remember if written in the journalistic form common to periodicals.[13] It is evident that the vocabulary of the magazine articles seems easier than that of science textbooks. (4) A number of pupils stated that they had developed a greater liking for library assignments, partly as a result of the experiment. (5) A distinct change of pupil preference was noticed toward the type of magazines represented by Popular Science, Popular Mechanics and Amazing Stories. Numerous requests have come from the pupils to include more science and science fiction magazines in the library.

A Summary of the Findings of This Study

A statement of the problem will be found at the beginning of the article and will not be repeated here. The findings may be summarized as follows:

(1) Experimental pupils read approximately 2.8 times as much as the control pupils. The scientific topics reported by them show that the reading was of general nature. This reading may be classified as general reference material.

(2) In tests dealing with the subject matter included in the courses of study of the several subjects, the experimental group exceeded their mates on 59.8 per cent of the trials and scored equally with them on 6.7 per cent of the trials. The control group excelled the experimental group on 33.5 per cent of the trials.

(3) In School No. 1, the control group exceeded the experimental group by 32 points or 1.6 per cent in total final scores, and by 78 points or 4.1 per cent in gains. The differences in gains were shown to be statistically significant by the ratio of 3.92.

(4) The experimental groups in School No. 2 showed their superiority by an average of 13 points in total final scores and 34 points or items in gains in general science. In biology,

13. Compare and contrast:
Verril, A. H., "The World of the Giant Ants", Amazing Stories Quarterly, Vol. 1, No. 4, (Fall Edition) 1928, pp. 436-529, and
Baker, A. C. and Mills, L. H., Dynamic Biology, (New York, Rand McNally, 1933) pp. 542-545.

the differences in total final scores were 45 items and the differences in gains were 59 items. The experimental group scored 129 items more in total final scores and 135 items more than the control group in gains in physics. The differences in chemistry were in favor of the experimental group by a difference of 173 items in total final scores and 180 items in gains. Ratios of 9.45 in the differences of gains in general science, 12.2 in those of biology, 7.3 in those of physics and 7.5 in those of chemistry indicate that these differences are highly significant.

(5) The experimental pupils in School No. 3 exceeded their mates by 49 points or 4.9 per cent in total final scores and 80 points or 8.7 per cent in gains in general science. The differences in favor of the same group in biology were 47 points or 4.9 per cent in total final scores and 66 points or 7.2 per cent in gains. In physics, the experimental group showed an advantage of 68 items or 6.6 per cent in total final scores and 47 items or 4.7 per cent in gains. The differences in chemistry were 86 items or 8.1 per cent in total final scores and 83 items or 8.0 per cent in gains. Ratios of the differences in gains were: in general science, 16.7, in biology, 10.6, in physics, 4.17 and in chemistry, 7.94. These differences are thus highly significant.

(6) The pupils in the experimental sections in School No. 2 knew 197 items more than the control group in tests on magazine articles. These items were additional to the superiority in course items previously indicated.

(7) Experimental pupils remembered the science items better than the control pupils.

(8) Boys excelled girls in general science and physics, but the two sexes were approximately equal in biology and chemistry.

(9) The amount and differences in gains increased with the maturity of the pupils in the experiment.

(10) The extensive reading program was preferred by the majority of the experimental pupils.

Limitations of the Experiment

The author recognizes certain limitations in the study. Perhaps the most outstanding feature is the lack of suitable measurements and data relative to the "lateral" or "by-product" information which was obtained by the extensive reading pupils. This problem does not include scientific aptitude, scientific attitude, or general information tests, nor does it attempt to measure concomitant or "by-product" learning.

Teacher differences, prejudices and personalities were beyond the control of the author.

Different results may be obtained by repeating the experiment and assigning definite reading activities to all experimental pupils. Hubbard[14] states that teachers should have a program of constructive reading for the pupils, and that learning should be carried to a point where skills are utilized in socially worth-while groups. In our study, much time may have been lost by the search through non-scientific materials for items concerning science.

Another phase of this same problem is that of the benefits derived from the reading of nonscientific materials. As these studies do not measure these benefits, the question is open for further experimentation.

In our efforts to find additional means of improving and worthily using our increasing leisure time, we will do well to give serious consideration to our choice of reading materials. Lies[15] states that we must hurry in our efforts to improve education for leisure. Money-grabbing purveyors of low-down recreation have been flooding the news

14. Hubbard, F. W., "Who Is the Criminal, Society or the Individual?", Journal of the National Education Association, Vol. 22, No. 4 (April 1933), p. 129.

15. Lies, E. T., "Education for Leisure", Journal of the National Education Association, Vol. 21, No. 8, p. 254.

stands with putrid books and periodicals. If we can, by a process of incorporating worth-while magazines into our curricula, improve the taste and preference for the better magazines, we may have a valuable outcome of experiments such as this. Our study does not measure such benefits; but it is not beyond the realm of possibility that these benefits may be more enduring and of greater importance than the approximate 5.0 per cent increase in factual information shown by this experiment.

It has been shown that extensive reading is an effective means of acquiring a knowledge of scientific facts. On the other hand, we may question the efficiency of the method. Our data would indicate at first glance that the experimental pupils read 2.8 times as much as the intensive study pupils and learned only 5 per cent more items of the course plus approximately 200 additional magazine facts per year. In this conclusion, we assume that the two groups read the textbook assignments only once. From the standpoint of efficiency, we also seemingly assume that the pupils' learning activities were confined to scientific facts and principles.

We may also raise the question concerning the probable use to which the pupils would have put the time spent in reading. Would this time have been spent beneficially in study hall, in club or activity periods, or would it have been wasted?

These limitations are manifest. Probably many others exist and are beyond the control of the experimenter.

Conclusions

From the findings of this study, we may conclude:

1. Extensive reading of scientific materials is a significantly effective method of acquiring a knowledge of scientific facts and principles.

2. The knowledge of facts and principles and the rate of acquiring them increase with the maturity of the pupils.

3. To a slight degree boys seem to exceed girls in a knowledge of scientific facts and principles.

4. The pupils' reading of scientific materials supplementary to the textbook is mostly of general reference nature.

5. Extensive reading pupils remember more scientific facts and principles than do intensive study pupils.

6. Extensive reading pupils learn a number of additional scientific facts which are not learned by the intensive study pupils.

7. Many pupils prefer extensive reading to intensive textbook study.

A Partial List of Similar and Related Studies, Experiments and Articles

Adams, Elwood, "Group Use of the Junior High School Library", School Review, Vol. 41, No. 4, p. 294.

Adams, Elwood, "The Extent of Library Reading in the Junior High School", School Review, Vol. 41, No. 5, (May 1933) p. 376.

Allen, I. M., "Some Experiments in High School Instruction" School Review, Vol. 22, pp. 26-44.

Bastian, F. F., The Relative Effectiveness of the Contract Vs. the Recitation Method of Teaching Biology, Unpublished Master's Thesis, Pennsylvania State College, 1931.

Bennett, E. E., "What High School Pupils Read in School Papers", School Review, Vol. 40, No. 10, (Dec. 1932) p. 772.

Carnegie Foundation for the Advancement of Teaching With the Joint Commission of the Association of Pennsylvania Colleges Presidents and the State Department of Public Instruction, Plate IV.

Clem, O. M., and Dudleston, J. J., "Factors Influencing the Common Science Knowledge of High School Pupils", Science Education, Vol. 17, No. 4, (Dec. 1933), pp. 267-272.

Colvin, R. B., "Advertisements as a Teaching Device in General Science",

School Science and Mathematics, Vol. 34, pp. 79-83.
Corbally, J. E., "A Comparison of Two Methods of Teaching One Problem in General Science", School Review, Vol. 38, (Jan. 1930), pp. 61-66.
Coryell, N. G., An Evaluation of Extensive and Intensive Teaching of Literature, Contributions to Education, No. 275, (New York, Teachers College, Columbia University, 1927).
Crawford, C. C., "An Experiment in Teaching History Backward", Historic Outlook, Vol. 22, No. 8, (Dec. 1931) pp. 395-397.
Curtis, F. D., A Digest of Investigations in the Teaching of Science, (Philadelphia, Pa., P. Blakiston's Sons & Co., 1926).
Curtis, F. D., A Second Digest of Investigations in the Teaching of Science, (Philadelphia, Pa., P. Blakiston's Sons & Co., 1931).
Curtis, F. D., Some Values Derived from Extensive Reading of General Science, (New York, Teachers College, Columbia University, 1924).
Douglass, W. R., "An Experimental Investigation of the Relative Effectiveness of Two Plans of Supervised Study", Journal of Educational Research, Vol. 18, (Oct. 1928) pp. 239-245.
Downing, E. R., "Does Science Teach Scientific Thinking", Science Education, Vol. 17, No. 2, (April 1933), pp. 37-38.
Essen and Cole, "The Effectiveness of the Contract Method", School Review, Vol. 37, pp. 272-281.
Finley, C. W., "Some Studies of Children's Interests in Science Materials", School Science and Mathematics, Vol. 21, p. 1.
Funk, N. M., "A Comparative Study of the Results Obtained by the Method of Mastery Technique and the Method of Daily Recitation and Assignment", School Review, Vol. 36, (May 1928) pp. 338-445.
Garber, E., "The Project Method of Teaching Chemistry", School Science and Mathematics, Vol. 22, pp. 71-73.
Harris, Daniel, "The Relation to College Grades of Some Factors Other Than Intelligence", Archives of Psychology, No. 131, (1931) p. 48.
Hill, H. A., "A Comparison Between the Biological Content of Certain Periodical Literature and the Kansan High School Course of Study", Science Education, Vol. 14, (Jan. 1930) pp. 430-436.
Hopkins, L. T., "A Study of Magazines and Newspaper Science Articles with Relation to Courses in Science for High Schools", School Science and Mathematics, Vol. 25, (Nov. 1925) pp. 793-800.
Hubbard, F. W., "Who is the Criminal, Society or the Individual", Journal of the National Education Association, Vol. 22, No. 4, (April 1933), p. 129.
Hunter, G. W., Science Teaching at Junior and Senior High School Levels, (New York, American Book Co., 1934).
Lies, E. T., "Education for Leisure", Journal of the National Education Association, Vol. 21, No. 8, p. 254.
Maller, J. B., Cooperation and Competition, Contributions to Education No. 384, (New York, Teachers College, Columbia University, 1929).
Noll, V. H., "Laboratory Instruction in the Field of Inorganic Chemistry", Journal of Chemical Education, Vol. 6, (Oct. 1929) pp. 1740-1747. Part III.
Powers, S. R., "Objectives of High School Chemistry", School Science and Mathematics, Vol. 25, pp. 832-833.
Powers, S. R., "Research in Science Teaching", Teachers College Record, Vol. 30, (Jan. 1929) pp. 334-342.
Powers, S. R., "The Correlation Between Measures of Mental Ability and Measures of Achievement in Chemistry", School Science and Mathematics, Vol. 28, (Dec. 1928), pp. 981-986.
Searle, A. H., and Ruch, G. M., "A Study of Science Articles in Magazines", School Science and Mathematics, Vol. 26, (April 1926) pp. 389-396.
Smith, D. V., "Extensive Reading in Junior High School", English Journal, Vol. 19, (June 1932), pp. 449-462.
Smith, V. C., "Science Vocabulary in Advertisements", School Science and

Mathematics, Vol. 33, pp. 449-462.

Starrak, J. A., "Textbook Teaching--A Word in Opposition", American School Board Journal, Vol. 87, No. 3, (Sept. 1933) p. 42.

Williams, R. R., "Extensive Reading Vs. Intensive Study in Literature", School Review, Vol. 37, pp. 666-678.

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